Eric Baker

The Monthly Review of the AMERICAN ELECTROPLATERS' SOCIETY

CONTENTS

A Christmas Message from our Founder 925
Weisberg—Rapid Methods for Heavy Nickel Plating ... 929
Tierney—Some of the Influences Affecting the Use of Spray Rinsing Facilities 937
Notes on Pitting 947
Branch News 952
Here and There 968
Year Index 970
The Abstract Section 974
Membership Report 994
Buyer's Guide 996
Branch Directory 999
Index to Advertisers 1000

DECEMBER 1939

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DECEMBER 1939

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A Christmas Message from our Founder

I desire to extend to every member of the A.E.S. through the MONTHLY REVIEW an earnest and sincere wish that all may enjoy a Very Merry Christmas and a Happy and Prosperous New Year.

In this troubled world of ours every American citizen, every stranger within its gates, should thank the Almighty Father, the Creator of all things, that here in America and its connecting territories the blessing of peace, and, to a great measure, Prosperity prevails.

May happiness, peace and prosperity continue and may America eventually be the handmaiden that will bring peace out of the present chaos in Europe.

It is my wish and hope that the American Electroplaters' Society will continue to grow in membership through 1940 and its influence throughout the electroplating and metal fabrication industries become of great value to them.

Step by step, on to a greater technical knowledge of the art by its membership, it is becoming a great factor in the industrial life of America — may it continue to be so for all time.

CHARLES H. PROCTOR
Founder of the A. E. S.
Twin Palms, Clearwater, Fla.

The Officers of the Supreme Society extend the best wishes of the Season to our Members, Advertisers and Subscribers to the Monthly Review.

May each of you enjoy a Merry Christmas and look forward to a bright and Prosperous New Year.

The Executive Board

A Merry Christmas to All

Ever since the invention of printing, thousands of men have sat down at this time of year to write Christmas editorials with the result that it is not exactly easy to do so without saying something that is perhaps hackneyed and shopworn. However, here goes, for better or for worse.

Christmas is a great institution. It does us good in a great many ways, and we can immediately hear the cynics saying, "Particularly in the pocketbook," but even that feature is an advantage in the long run. If we could just sufficiently increase the velocity of money, most of our economic woes would disappear of themselves, and anything tending to accomplish that purpose is an advantage eventually to the individual, even if the January bills are tough.

Christmas brings together far-flung families who probably never would gather all at one time under any other circumstances except death. It gives an opportunity to exchange gifts, and it is good both to give and receive, even if all the money were wasted, which it is not by a good deal. It renews friendships, through cards, with people who have drifted out of one's life.

It is good for us to get down on the floor and make the monkey run up and down the stick (for Baby, maybe) or monopolize Junior's new electric train for a half-day at a time.

It is even good for us to mash our thumb putting up electric lights around the front door or get pine-needles in our eye, trimming the tree, more or less on the same principle as Mark Twain's "A few fleas is good for a dog. It keeps him from worrying about being a dog." Besides it tends to break down inhibitions and increase the vocabulary.

Friends and relatives come closer together at Christmas-time. It gives us something else about which to think. We all relax and have a good time, and we are all better off for it.

But there is another side to Christmas which we are somewhat prone to forget. We are celebrating the birthday of a great Man. Be he Jew or Gentile, follower of Mohammed, Buddha or Confucius, or plain agnostic, no intelligent man can question that Jesus of Nazareth was a great Man who brought into the world a wonderful doctrine.

"Love thy neighbor as thyself" is strong medicine, too strong for the world to assimilate in its entirety as yet, but that doctrine

has tempered and changed history in the past and it seems to hold the hope of the world for the future, unless we vision civilization destroying itself, like a pack of starving wolves, which is a picture we refuse to recognize.

The world has need for tolerance. Hate is one of the easiest of human emotions and by all means the most unprofitable. Love is more difficult but a great deal more satisfactory to all concerned.

There must be differences of opinion in the world, otherwise we would all want to marry Myrna Loy, and certainly if Franklin, Edison, Ford, Kettering, etc., had all thought just as everyone else, the world would not have made much progress. It is not necessary to hate a man just because you do not happen to agree with him. Furthermore, if you got out on a party with him, sometime, you might find him a swell egg, even if he does not agree with you on politics, or economics or something.

Our observation is that the world is a pretty nice place in which to live and that the average individual has a good deal of pleasure out of life, even if he does not succeed in getting everything he wants, but there is no question that the world would be a still more pleasant place in which to live if we could eliminate hate, and substitute at least tolerance, if not love.

Consequently we believe that it is fitting, in this year above all others, that, regardless of our religious convictions, we cast a thought to the Man who brought the doctrine into the world which may prove its economic, if not its spiritual, salvation.

We are only a layman, trying to preach a sermon, and perhaps it is not very well done, but we can assure you that it is sincere. Also that to the best of our ability, we try to practice what we preach, so

Merry Christmas to You and All Yours
God Bless You and Protect You

We do not give a whoop whether or not you agree with us on anything on earth, with one exception. We like you and we want you to like us. You are a grand guy, whether we have ever laid eyes on you or not, and we want you to tilt a glass to us on Christmas day, even if there is only water in it, just as we will to you.

President Goodsell's Letter

As we welcome in the new year let us pause a moment and look back over the past year. Has it brought out all the accomplish-

ments we expected? Have we put forth the effort to effect these accomplishments? Can we not, with more diligent effort on each of our parts, accomplish more than we did in the year gone by? With these thoughts in mind, let each of us for the new year resolve to put forth every effort to help our Supreme Officers in the duties assigned to them, to arrange for more and better exhibits for the Dayton Convention and to take an active part in the Educational Program. These are things we can do without too much effort on our part and will assist materially in promoting the welfare of the A.E.S.

Our Society is growing rapidly. We now can boast of more than two thousand members. This means more work for the executive secretary and editor of the REVIEW. He has worked very hard to increase the advertising in the REVIEW and would welcome any reading material from you that would be helpful and educational to the membership.

The old proverb is, "You get out of life just what you put into it," and so it is with your membership in the A.E.S. Much has been accomplished in the past months and more can be accomplished with the whole-hearted cooperation of the members. We should miss no opportunity to do our part in the various activities of our Society. The meetings of our branches are becoming more and more helpful. The type of papers being presented is the best indication of the interest in these meetings. The discussions on these papers and related matters prove the accomplishments that can be made. For the entire year let us resolve to attend these branch meetings more regularly and go prepared to take part in the discussions. Bring any ideas with you that will be helpful to your fellow members. Each of us, at some time or other, has stumbled onto something that has taken the kink out of some problem. These items and various time-saving steps you have developed make fine topics for meeting discussion.

We know that the Research Committee is in good hands and that the Committee will present a program which will be of vital interest to all of us. They have a large job on their hands and are making every effort to make it a success. Your co-operation and loyal support in their work will be greatly appreciated.

Dayton is the 1940 Convention city. The city has everything to offer in the line of fine hotels, amusements, etc. The Convention Committee is working hard to make this the greatest convention ever held by our Society. Now is the time to make your plans to "Wing your way to Dayton in 1940."

Let me close with the wish that a feeling of friendliness and co-operation may exist among our branches and members and that you may have a Merry Christmas and a Happy New Year.

R. M. GOODSELL, *President*

Rapid Methods *for* Heavy Nickel Plating

By LOUIS WEISBERG, *Ph. D.*

Louis Weisberg, Inc., New York City

Read at Philadelphia Branch Meeting, November 18, 1939

IT gives me pleasure to accept your invitation to come here today and take part in this program. I am especially glad to discuss the subject of heavy nickel plating, which appears to hold considerable promise as a means of opening up new fields for the application of electroplating, and corresponding new opportunities for qualified platers.

As you know, the term heavy nickel refers to thick deposits. A comparatively few years ago, deposits one or two thousandths of an inch thick might have been so classified, but the increasing use of such thicknesses for corrosion resistance makes it desirable to reserve the term heavy nickel for deposits well above this range.

Heavy nickel finds application in building up new parts that are under size and old parts that have been worn down, in supplying a hard wear resisting surface, and in electroforming. Deposits of the order of 0.005 inch are being applied for resistance to wear, or combined corrosion and wear. Deposits of 0.010 to 0.030 inch are needed in building up worn or undersized parts, while in some cases as much as 0.1 to 0.2 inch have been used in building up large worn parts and in electroforming complete pieces. Those interested in further details along this line may find them in an excellent paper by Dr. Wesley in the MONTHLY REVIEW.

In many of these applications, the nickel may have to be machined; in others it is subject to severe wear. The outstanding characteristic of heavy nickel plating, therefore, in most cases is the importance attached to the mechanical properties of the deposit. Characteristics of the deposit which need hardly be considered in coatings applied for decoration or to meet ordinary

corrosive conditions become more and more important as the thickness is increased. The reverse of this also holds with regard to certain other characteristics. For example, appearance, which counts above everything else in ordinary plating, is usually a secondary factor in heavy deposits. If the deposit is sound and has the right physical properties, appearance generally takes care of itself. As another example, we may consider porosity. This is a pressing problem in thin deposits, but porosity usually disappears when the thickness reaches 0.002 inch or thereabouts. Accordingly, porosity is seldom encountered in thick deposits unless the deposits are not cracked. Cracking though, is another story.

As a rule, the requirements for heavy nickel are that it shall have sufficient strength and toughness to stand machining or wear. The ductility or hardness may also be required to fall within given limits.

Apart from the convenience of electrodeposition as a method for putting the nickel where it is wanted, the advantage of electrodeposited nickel in many applications lies in the fact that its physical properties may be varied over an extremely wide range so as to meet almost any required specifications. The tensile strength of cast nickel ranges upward from 55,000 pounds per square inch; for cold rolled hard nickel, the tensile strength reaches 105,000 pounds per square inch. In electrodeposited nickel, tensile strengths varying from about 50,000 pounds to 130,000 may be produced by comparatively simple changes in operating conditions. The Brinnell hardness number for ordinary nickel runs from about 80 for cast nickel to 230 for cold rolled hard nickel. The range of variation for electrodeposited nickel is from 125 to about 500. In comparing the elongation, it is necessary to distinguish between the softer varieties of electrodeposited nickel for which this property compares favorably with the 15 to 30% for ordinary nickel which has not been annealed, and hard deposits for which the elongation drops off sharply and may fall to almost zero. After annealing, of course, electrodeposited nickel approaches the same physical state as other forms of nickel and shows a corresponding change in properties.

There is not time today to discuss the physical properties of nickel as fully as they deserve, but fortunately Dr. Wesley has summarized most of the available data. The principal studies on this subject have been made by MacNaughton and Hothersall in England and by investigators in the International Nickel Company's laboratories here. Considerably more work needs to be done, especially under conditions where rapid plating is obtained.

It hardly needs to be mentioned that rapid methods are necessary, or the whole idea of plating thick deposits becomes impractical. At the best, heavy nickel plating must remain limited in scope unless the required thicknesses can be applied in a reasonable time. Slowness in building up the thickness necessary may have been one reason why heavy nickel plating has not found more extensive application up to this time. However, this has not prevented considerable use of it in England, where the plating rate for the most part has been extremely slow.

The most commonly used solutions for plating thick deposits are made substantially according to the Watts formula:

Nickel sulphate (single salts)	32 ozs. per gallon
Nickel chloride	6 ozs. per gallon
Boric acid	4 ozs. per gallon

This type of solution is adequate for most purposes. With proper equipment and choice of operating conditions, the rate of deposition should not be less than 0.002 inch per hour and may go much higher. In order to get the maximum speed from this type of solution, it is desirable to keep the nickel content high; some therefore prefer to increase the nickel sulphate to about 48 ounces per gallon. High temperature, vigorous agitation, and low pH are the conditions favoring rapid plating.

The physical properties of the deposit are influenced more by the pH value of the solution than by any other one factor. Tensile strength and hardness increase with increasing pH, while elongation or ductility decreases. The hardness particularly increases very sharply as the pH goes through a value somewhat above 5. Since pH is also one of the main factors in controlling the per-

missible current density, it is evident that the rate at which heavy nickel can be deposited depends to a considerable degree on the properties the nickel is required to have. The highest rates may be used to produce soft deposits, for example, with Brinnell hardness numbers around 150. Such deposits are best applied from a solution having a pH value of about 2. Medium hardness is obtained in the higher pH range, while the greatest hardness requires addition of other chemicals to the solution.

Before current densities can be specified, it is necessary to take into consideration not only pH, temperature and agitation, but also such matters as how the work is held and whether or not the edges are guarded. Since the permissible current density increases with the temperature, fairly high temperatures should be used for rapid plating. A temperature of 150° to 160° Fahrenheit, or even higher, is desirable. Temperatures close to boiling have been used in a limited way with current densities of approximately 400 amperes per square foot. There are drawbacks to operating at boiling temperatures, but 180° should be practical. Higher temperatures have the further advantage of reducing the danger of cracked deposits. Agitation of the solution or motion of the work is also favorable to maximum speed of plating. Agitation, for example, by means of air, permits current densities higher than the ordinary means used to move the work.

Every plater, of course, knows that higher average current densities can be maintained when the edges and high spots on the work are guarded. How far is it worth while to go along this line? Here is where experience and judgment must determine whether in the long run it is more economical to plate more slowly or to spend money for fixtures and so plate faster.

With good agitation and a temperature of about 160° Fahrenheit, in a solution having a pH value of 2, it is possible to plate at current densities as high as 100 to 150 amperes per square foot under favorable conditions. Without agitation the current density is limited to about 60 amperes per square foot. With a pH value above 5, the current density must be reduced below these figures. With vigorous agitation, it is still possible to use current densities

up to 100 amperes per square foot. Without agitation, the current density must be cut down to about 50 amperes per square foot.

To obtain additional hardness, a solution containing about 16 ounces of nickel sulphate and several ounces of ammonium sulphate to the gallon has been suggested. So far as the nickel content is concerned, this is a move in the wrong direction, because reducing the nickel content has no appreciable effect on the hardness, while it does reduce the rate at which nickel can be deposited. The addition of ammonium sulphate, though, has a pronounced effect on the hardness which can be utilized just as well in solutions with high nickel content. It is true that less ammonium sulphate can be added to such solutions on account of the low solubility of the double salt, nickel ammonium sulphate. However, relatively small quantities of ammonium sulphate are sufficient except where extraordinary hardness is required. Ammonium sulphate should not be used at all unless the ammonia content is controlled by analysis. The amount of ammonium sulphate should not exceed one ounce per gallon. For maximum hardness, the pH value should be maintained between 5.2 and 5.8 (electrometric).

It should hardly be necessary to mention that sound deposits of heavy nickel cannot be obtained unless the solution is reasonably free from suspended matter. This entails filtration, which may be either periodic or continuous, provided it is sufficient to keep the solution clean. Agitated solutions have to be filtered more frequently than still solutions since there is no opportunity for dirt to settle out. Even deposits that are not rough to the touch may contain enough occluded dirt to show up when examined under the microscope. Removing the last traces of suspended matter from a solution is difficult by ordinary means, but if a suitable filter aid is used, adequate clarification is obtained. The right type of filter aid for this is not one that gives the highest rate of flow, but one that takes out the fine particles.

The methods of heavy nickel plating described so far involve nothing fundamentally new, but represent simply the application of what has already become the best practice in plating nickel for ordinary purposes. In no respect is this more the case than when

considering the effect of impurities in the solution. Bright nickel has emphasized the important effects produced by impurities, but such effects are by no means confined to solutions used for bright plating. They occur in every nickel plating solution and are particularly important in solutions used for heavy nickel plating, because they may bring about very important changes in the physical properties of the deposit. An otherwise strong and tough deposit may become brittle and cracked through the effect of minute amounts of impurities, or a deposit intended to be soft may become too hard to use.

This is much too large a subject to treat in passing. Fortunately the need for methods of purifying bright nickel solutions has resulted in the development of a number of procedures which are much simpler to apply than any of the methods available a few years ago. Precipitation and oxidation methods are giving way to absorption on activated carbon and activated clay and to selective electrolysis. These methods can be adapted to continuous operation and are being so used already in a number of places. In my opinion, it is likely that methods for continuous purification will become widely used in plants of the better type, whether for bright nickel, ordinary nickel, or heavy nickel.

The production of heavy nickel deposits requires absolute suppression of pitting. Hydrogen peroxide is effective, though rather a nuisance. Anti-pitting agents of the surface tension depressing type are also effective, but solutions to which these have been added have to be watched to make sure that the organic material, or decomposition products formed from it in time, do not affect the deposit unfavorably. Some of the anti-pitting agents in common use have been known to cause trouble of this nature. If the solution is purified regularly, such difficulties can be avoided.

I come now to another type of solution for heavy nickel plating. This is a modification of the bright cobalt nickel plating solution using formate and formaldehyde. The modification consists in reducing the proportion of cobalt or leaving it out altogether. If cobalt is omitted, this has the following composition:

Nickel sulphate	32 ozs. per gallon
Nickel chloride	6 ozs. per gallon
Nickel formate	6 ozs. per gallon
Boric acid	4 ozs. per gallon
Formaldehyde	0.3 ozs. per gallon

As in the Watts solution, the hardness and other properties may be varied over a wide range by changing the pH value. Deposits made at a pH of 2 are soft. The hardness increases with increasing pH, but more rapidly than in the Watts solution. But while both ammonia and formate increase the hardness, formate has less effect on the ductility. Accordingly, it is possible to obtain hard deposits from the formate solution with better ductility than in deposits of equal hardness produced by means of ammonium sulphate. For example, if the bend values are measured on a Jenkins bend tester or similar machine, the values obtained from the formate solution are always higher for a given hardness than for deposits made from a solution containing ammonia.

Another advantage of this type of solution is the fact that, in general, a given hardness value can be obtained at a lower pH value than with ammonium sulphate alone. This makes it possible to plate at a correspondingly higher rate. Still another advantage of the formate-formaldehyde solution is its inherent freedom from pitting. It has never been necessary to add anti-pitting agents of the surface active type to this solution. Extremely hard deposits with Brinnell hardness numbers approaching 500, may be obtained by using ammonium sulphate in conjunction with nickel formate and formaldehyde. The amount of ammonium sulphate should not exceed a little over a half of an ounce per gallon, for beyond this the ductility falls away to almost nothing.

Even harder deposits—up to about 550 Brinnell—are obtainable by the use of organic colloidal materials. Generally speaking, these are more difficult to control than the agents already mentioned, and it is advisable to avoid additions of this type whenever possible.

Sometimes it is desirable to have a means of overcoming stress in thick nickel deposits. For example, if a heavy deposit is applied

on one side only of a flat plate, it may show marked buckling. The forces involved are so great that a hydraulic press may be needed to flatten the plate. Certain naphthalene sulphonic acids can be used to counteract such stress. When used in proper amount, they cause the plate to remain flat, but when too large a quantity is added, they may cause the plate to buckle in the opposite direction.

Another trouble sometimes encountered in building up heavy nickel deposits at high current densities is the tendency to form nodular growths and trees. Dr. Wesley has recently reported an investigation of an all-chloride solution, one of the chief advantages of which he reports to be less tendency to form such growths. The composition recommended by Wesley is:

Nickel chloride	40 ozs. per gallon
Boric acid	4 ozs. per gallon

Deposits from this solution are harder and stronger, though somewhat less ductile, than deposits from a soft sulphate solution. The all-chloride solution is also better conducting than sulphate solutions and apparently shows less susceptibility to pitting. It can be used at current densities up to 100 amperes per square foot or more.

The sulphate solution which Wesley used for comparative purposes contained only a little over two ounces per gallon of nickel chloride. Dislodgment of fine conducting particles from the anode probably has a great deal to do with the formation of nodular growths and trees; so it is likely that with more chloride and better anode corrosion, the sulphate solution would give better results than it did in Wesley's experiments. Anyway, the effect of using higher chloride in the sulphate solutions as well as the performance of the all-chloride solution, merit further investigation.

In conclusion, the successful use of rapid methods for heavy nickel plating depends on proper supervision. The skill and judgment of the individual plater are essential ingredients in the formula for success.

Some *of the* Influences Affecting *the Use of* Spray Rinsing Facilities

By J. D. TIERNEY

Read at New Haven Branch Meeting
November 21, 1939

IT APPEARS . . . even in the very limited amount of approach which has been made toward the goal of improving rinsing results . . . in the procedure of manually controlled plating operations . . . that an adequate water spray method of rinsing . . . offers many advantages worthy of consideration . . . acceptance . . . mastery . . . and application.

Some of the major features . . . definitely found in spray rinsing facilities . . . designed for producing improved surface cleaning effectiveness . . . and reducing plating costs . . . are—

(1) Cleanliness of Surfaces to be Plated,
(2) Minimizing Contaminations Caused by "Carry-Over,"
(3) Lowering Alkali and Acid Costs,
(4) Savings in Plating Production Time,
(5) Decreasing Plating Equipment Costs,
(6) Reclamation and Conservation of Floor Space,
(7) Recovering and Saving on Water Costs,
(8) Use of More Effective Cleaners or Detergents,
(9) Lessening Costs of Waste Disposal Facilities,

In addition to these nine major points of consequence . . . there are many other minor influences to be considered . . . any one of which . . . either major or minor . . . is important to every department head and executive . . . who is responsible for lowering costs and increasing profits in the conduct of electroplating procedure and control.

Depending upon the general or special local conditions which will be found to exist . . . and prove to vary to a great extent . . . in any one plating department compared with another . . . the order of importance regarding the nine major points . . . may also alter and change.

However . . . it can be regarded, generally speaking, . . . that . . . "Cleanliness of Surfaces to be Plated" . . . is one of the most

significant and highly important subjects for attention and serious thought. It is an essential factor in any cycle and order of sequence . . . from the soak or cleaner tank . . . through every variety of preparatory and plating bath . . . to the final hot or cold rinse and drying facilities. One immersion resulting in contamination at emersion . . . at any one point in the sequence of the cycle . . . results in spoiling every operation required in the cycle . . . and adds to costs by the necessity of stripping and replating again. . . through the cycle of operations.

Most every plater has experienced his "Sally Rand" days . . . when strip and replate meant "strip-tease" to him. The "strip-tease" that exists in the "still" type . . . most commonly used immersion rinse tank . . . can with rare exception be eliminated . . . by adoption and use of adequate spray rinsing tank facilities.

Wherever the plating room "strip-tease" is caused by unclean "still" tank immersion rinsing . . . it is quite often the plater's own fault . . . because he can, if he would decide to do so, . . . protest against the existence of facilities that are lacking in dependable rinsing effectiveness. There is no shorter route . . . to cutting plating room "strip-tease" costs . . . than the route that leads to clean . . . uncontaminated . . . rinsing water.

Among the influences that affect hot water rinsing . . . most every plater has always had good reasons . . . for voicing dissatisfaction with the condition of hot water, final rinse, tank solutions . . . especially during the latter hours of the production day . . . when . . . to call it a "solution" . . . comes very close to being entirely correct.

Even though a substantial inflow of clean water is maintained . . . and extra money is spent . . . for the extra amount of steam required to heat the extra inflow of water . . . it ceases to become water when drag-over contamination . . . in reality . . . builds it up to classify as a solution . . . an aid to producing a first class job of spotting and staining. Have you ever analyzed a 3 P. M., final hot water "solution" to understand its impurity content?

Spray rinsing . . . before final hot rinsing . . . is an excellent means, and way, of reducing rinsing costs substantially. It tends to keep clean hot water, clean. It minimizes water inflow. It reduces steam consumption and lowers water heating costs.

Spotting and staining difficulties . . . at worst become negligible . . . and at best cease to exist.

In most cases . . . the second and third . . . most important major points . . . of decreasing costs and increasing profits . . . by the use of adequate spray rinsing facilities . . . will be found in the subjects of . . . "Minimizing Contaminations Caused by 'Carry-Over' " . . . and "Lowering Alkali and Acid Costs."

These two predominant subjects . . . closely parallel and seem to go "hand in hand" . . . with "Cleanliness of Surfaces to be Plated." Eliminate the latter and you automatically dispose of the second and third most important "cost-builders." In all cases where "carry-over" . . . can be maintained to a condition of clean . . . uncontaminated water . . . there can be no existence of alkalis mixing with acids . . . or vice versa . . . to cause whatever amount of neutralization that occurs by reason of such combining. Each time a rack and the work thereon . . . on emersion . . . carries over even a very small percentage of alkali from the "still" immersion type of rinse tank . . . several things immediately occur in an acid solution . . . the most affecting of which follows.

(a) a certain amount of the acid is neutralized,
(b) the main body strength of the acid is decreased,
(c) the function of the main body of the acid is diminished,
(d) as a result . . . additional acid . . . must be replaced . . . at extra cost . . . to take the place of the amount neutralized.

In cases where contaminated "carry-over" . . . has its ill effects . . . on plating solutions . . . especially in those types of solution where the pH value must be maintained . . . at critically close range . . . the "forced replacement" (amount lost by neutralization) costs are proportionately higher and the corresponding losses naturally greater . . . than that which has its course . . . in the "preparatory baths."

It would prove mighty interesting and constructive, . . . and by the same token to a very great extent . . . quite astonishing, to many plating department heads . . . to ascertain the amount of neutralizing "carry-over" they are using daily. Analysis of the various "still" rinse waters . . . following each preparatory bath and plating solution . . . from which "carry-over" occurs to the

following baths . . . in the condition in which each rinse is maintained with regard to the amount of clean water inflow and overflow . . . when the rinse water is being used at peak production periods . . . would no doubt . . . reveal the approximate amount of "forced replacement" acid and alkali costs . . . and at the same time . . . would uncover the fact . . . that in all cases where "still" tanks are now being used for rinsing purposes . . . it is quite essential to maintain a *greatly increased* water cost inflow . . . in order to decrease . . . to a very small extent . . . the "forced replacement" acid and alkali costs which accrue by reason of contaminated "carry-over."

Another and perhaps better way to ascertain the amount of "forced replacement" costs of acid . . . caused by "carry-over" of the alkali content from alkali "still" rinse water . . . would be to collect and measure the amount of water that adheres . . . to each size and type of rack . . . when loaded with the kind and quantity of work for which each rack is designed.

Adhered water from one each of the various different racks and the work thereon . . . as generally emersed from the alkali rinse tank . . . could be collected separately . . . in a container in which each rack would be allowed to drip dry.

The measured amount of drippings collected from each type of rack and work . . . multiplied by the number of racks of each type passing through the cycle during the day's production hours . . . would furnish a general idea of the minimum amount of total "carry-over" . . . of water and alkali content . . . into the acid bath . . . (some would be lost by evaporation).

An analysis of the alkali content in the drippings . . . would furnish general knowledge . . . of (1) the average amount of alkali which was entering the acid bath daily . . . (2) the amount of neutralization . . . and (3) the cost of "forced replacement" . . . all of which could be avoided with proper spray rinsing facilities.

The fact should not be overlooked . . . that "still" rinse tank waters following alkali and acid preparatory baths . . . even when equipped with well distributed water inflow facilities and dam type overflows for skimming . . . will build up . . . depending upon the quantity of water inflow as compared with the water

capacity of the tank . . . substantial amounts of neutralizing solution content . . . in the forms of alkali and acid . . . respectively.

Proof has been established . . . that adequate spray rinsing tank facilities . . . can be used most economically . . . in controlling "carry-over" contamination and its resultant extra alkali and acid costs.

On some influences affecting . . . "Savings in Plating Production Time" . . . it is common knowledge . . . that agitation is not only a most important aid to rinsing plated ware . . . but is also seriously essential and necessary . . . in most cases . . . where manufactured products are plated.

In some minority of cases . . . racks of work can be well rinsed by the simple process of dipping in and withdrawing . . . without any agitation . . . other than the amount of water movement which is caused by the water displacement . . . from the beginning of immersion to the end of emersion . . . and the amount of water movement resulting from replenishing water inflow and overflow.

On the other hand . . . where it seems that the majority rules . . . when the design and form of plated ware offers anything more in irregularity of surfaces . . . than plain shapes and surfaces do . . . agitation on manually operated plating cycles must be employed . . . in some cases . . . to a very great extent.

The methods most used . . . are usually adapted and adopted to the extent of whatever amount of agitation is required.

Where the requirement is excessive . . . compared to the average . . . the water movement is usually controlled by a propeller or other mechanical device driven by applied force.

Many of the "swashing" mechanisms . . . are still considered essential to rinsing requirement . . . when continuity of upward and downward mechanical movement . . . creates the desired amount of water movement . . . over the area of the work to be rinsed.

One often sees . . . combinations of water tanks and inclined perforated barrels or chutes or movable buckets . . . being rolled or otherwise operated in motion . . . to move water by tumbling the work in the barrel, chute or bucket.

In other instances compressed air and special air distributing coils . . . are found in use for active agitation purposes.

The most popular practice in general use . . . without question, is that of the "old elbow grease" . . . the human element combination of brain and brawn . . . where plating operators are paid for using their heads with their hands and eventually learning to know . . . just how hard they must plunge the various kinds of racks and work into the tank . . . how many times each must be shaken up and down . . . to what angle each must be tipped and in how many directions . . . and how fast or how slow each must be withdrawn from the tank . . . for quick "carry-over" and repeated operations in the next tank.

One recent improvement is well designed . . . in the form of a combination air-suction-agitator and syphon breaker. This device when properly connected in the inflow water line for its functions . . . draws in and mixes room atmosphere with the inflow water . . . both being conveyed to the bottom of the main body of the rinse water . . . through a pipe extension for discharge. The air rising to the surface . . . creates agitation that can be increased . . . or decreased . . . by hand valve control of the water volume and pressure. Overflow is accomplished . . . at the same time . . . in the same way.

Now the particular thing . . . as you may have already noted . . . in the different ways that agitation of rinse water is produced . . . is the fact that each respective way centers around one purpose . . . that of moving water over the surfaces of the parts to be rinsed . . . preferably clean water for the purpose of cleaning the parts. If this is true . . . doesn't it seem . . . that clean water . . . plus agitation . . . should prove to be the perfect combination?

Either one . . . cannot very well be used alone . . . without the other. Both are essential. Both cannot be found to exist together in "still" rinse tanks. However, both are definitely present . . . in properly designed spray rinse tanks . . . where the agitated motion of the spray furnishes highly impinged, clean, uncontaminated water . . . for cleansing purposes . . . and in doing so . . . cuts costs by eliminating the "old elbow grease" . . . and many of the other methods that have been . . . and are still being

bought . . . at high prices . . . to be found in due time . . . impractical and uneconomical.

Good spray rinsing tank facilities . . . unlike the best of "still" rinsing tank equipment . . . can be used as dependable assets for furnishing clean water . . . plus high impact agitation . . . as a means of cutting cost and increasing profits in plating production time.

In the use of adequate spray rinsing tank facilities . . . the initial and upkeep costs of tank and accessory plating equipment can be reduced . . . and floor space can be saved.

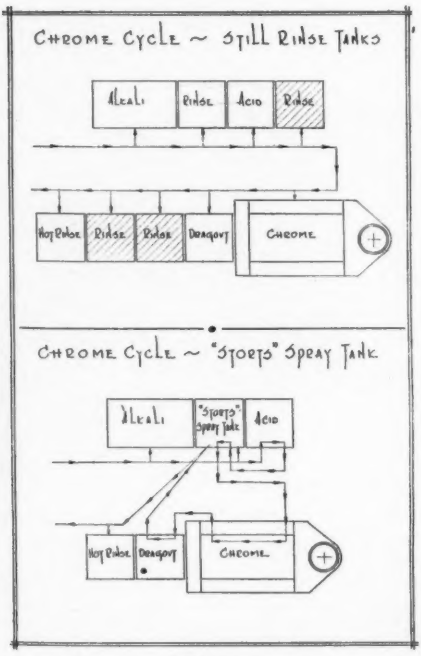
Constructive common sense planning . . . based on consideration of all the requirements necessary for . . . completion of the proper order and sequence of the number of immersions required . . . in performing any cycle of cleaning and plating operations . . . and in which adequate spray rinse tanks will be included . . . will result in . . . reduction of the number of tanks and costs of accessory equipment . . . used for general plating purposes.

In some rare cases . . . where the ware to be plated involves internal, hard-to-get-at surfaces . . . which cannot be reached by general spray rinsing arrangements . . . the rinsing of these special parts can be greatly improved . . . over present practices . . . by combining small sized "still" tanks (just large enough to accommodate the largest racks) equipped with air-suction-agitator devices and distributing coils.

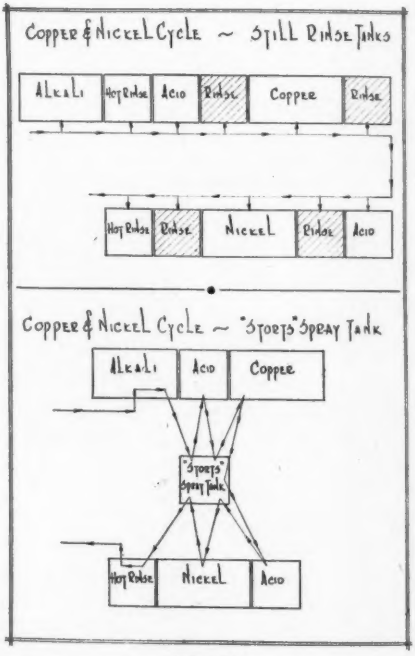
When the supplementary . . . air-suction-agitator still rinse tanks . . . are required for use in conjunction with spray rinsing tanks . . . to master the harder rinsing problems . . . the order of rinse procedure is . . . first, into spray . . . second, to air-suction-agitator rinse . . . and third, back to spray again. The first spray dip removes all the adhering solution from all the surfaces that spray will reach . . . and eliminates "carry-over" of that amount of solution into the air-suction-agitator rinse . . . thus keeping the supplementary "still" water . . . as clean as possible. The combination of air and water movement . . . in the air-suction-agitator rinse tank . . . treats with all the internal, hard-to-get-at surfaces more effectively . . . than any amount of the more costly "elbow grease" movements could accomplish . . . in many times the same length of time . . . when using the old style "still" rinse

tanks. The final redip in the spray . . . then removes whatever amount of contaminated water which is picked up in the air-suction-agitator tank. Thus, all "general" surfaces are made free of contamination . . . while the "special" internal, hard-to-get-at surfaces are treated at best.

To dwell briefly . . . on the subject of floor space saving . . . and so that you might have a few concrete examples . . . of floor space reclamation . . . we refer to the booklet . . . "Rinsing with Spray."



(Fig. 1)



(Fig. 2)

On pages 12 and 13 . . . the booklet illustrates and describes . . . space saving . . . and minimum amounts of "back tracking" . . . in comparing a "straight line" typical chrome cycle for "general" plating use . . . with a cycle designed for "cross aisle" movements. (Fig. 1)

On pages 14 and 15 . . . a typical combination . . . of copper and nickel cycle . . . is illustrated and described for the same purposes. (Fig. 2)

In both these comparisons . . . the shaded tank areas . . . indicate the elimination of old style "still" tanks . . . and let's not forget . . . the amount of contamination that existed in each one. The illustrations further point out . . . how spray rinse tanks . . . can be utilized to save space . . . time . . . water . . . and other accessory items of cost and also signify . . . how better . . . cleaner . . . rinsing results can be obtained at the same time.

Throughout all the previous subjects . . . we have referred to some extent to the subject of "Savings on Water Consumption."

The major point of influence . . . we wish to emphasize on this subject is . . . that while water savings resulting from the use of spray rinsing tank equipment . . . will prove to be substantial in many installations . . . it can at its best . . . only prove secondary or minor . . . to the savings accruing on most of the other cost cutting subjects.

It should be pointed out however . . . in favor of the importance of water costs . . . that we have found spray rinsing equipment to furnish savings of five to eleven gallons . . . per minute . . . per tank. One of the best features in this regard . . . is the on and off control that can be maintained . . . with either the foot pedal or the hand lever types of tanks. Water is not allowed to run free and wasteful. Only the amount required for actual rinsing is used. There is no waste.

On the subject of . . . "Using More Effective Cleaners and Detergents" . . . we are informed by authorities on the subject of cleaners that the high velocity impact of spray action . . . is going to gradually and eventually result in the use of more effective . . . and less costly . . . cleaning materials . . . which are not now used . . . because the "still" rinse "elbow grease" agitation method of rinsing . . . will not readily and thoroughly remove some of the stronger . . . more effective cleaning agents.

On the last subject of . . . "Lessening Costs of Waste Disposal Facilities" . . . it can be readily understood . . . that plating room water meters . . . wherever installed . . . are an accurate guide of prediction to plating department heads . . . who find that continually increasing production . . . automatically requires additional water consumption . . . to the quite often extent of adding more . . . or increasing the size of waste systems . . . which were

designed no doubt . . . more than ample in size in the beginning . . . but have become inadequate . . . after production passed the initially anticipated estimations.

Where savings of five to eleven gallons of water . . . per minute . . . per tank . . . can be obtained in spray rinse tank facilities . . . it is easy to understand . . . that waste disposal sizes . . . and maintenance costs . . . can be favored in proportion.

This partial list of . . . "Influences Which Affect the Use of Spray Rinsing Facilities" . . . should not be closed . . . for the time being . . . without a few words of thanks and reference . . . to those of you who so ably assisted us during the development period . . . by your respective contributions of time and advice . . . when we sought research information from you concerning things which could be answered . . . only . . . from the wealth of your long years of experience in plating. Without your unselfish giving . . . we would have been severely handicapped. If you had not extended a helping hand . . . we might still be in work of development. In this . . . our first paper of influences . . . we want to publicly express our thanks and appreciation.

NOTICE

Mr. G. B. Hogaboom will speak to the Cincinnati Branch, February 1st, 1940.

Baltimore-Washington Branch Annual Meeting will be held at the University of Maryland on Saturday, Feb. 3. The speakers will be R. O. Hull, W. B. Stoddard, Jr., A. B. Wilson and W. A. Wesley. Dinner at 7 P. M. at the Calvert Inn, College Park. Tickets $2.00 per plate.

IN MEMORY OF OLIVER J. SIZELOVE

Gone is a man, loved by one and all; and all who knew him loved him so
But from up above there came a call
Which took the man
The A.E.S. loved most of all.
He was ready and willing to go! But the sorrow he left he will never know
Yes! Everyone loved him, but God loved him best
So He called him to Heaven
And there gave him Eternal Rest!

JOSEPH S. CALABRESE
35 Norman Road
Newark, N. J.

Notes *on* Pitting

Of all the age-old disputes between the polishing room and the plater none has been longer nor more bitter than that which occurs when pits show either after plating or after buffing. The polishing foreman says that it is in the plating. The plater says that it's in the basis metal. Just a good fashioned argument — " 'Tis" and " 'Taint." Usually the plater is right. He usually knows nickel pits and the polisher doesn't or anyway he won't admit it.

Now this isn't a technical nor scientific article. It is merely something that we came across in our everyday work which might be of interest to you. It bears out what most of you have seen drawn on the blackboard many times to illustrate the different types of pitting.

These sketches are usually as shown in Figure # 1, where "A" shows the type of pit caused by a hydrogen bubble and "B" that caused by a particle of dirt on the surface of the work.

Recently in our case there was a hullabaloo about pitting. It was all blamed on the nickel plating. To those of us, who were sufficiently experienced to know, it was readily apparent that part of it was due to pitting in the nickel. It was equally obvious, though, that part of it was not due to the plating. However, it was impossible to sell this after we had admitted that part of it was nickel pitting, so samples were finally sent to the laboratory for investigation.

These parts happened to be die-castings.

At the laboratory, sections were cut close to the pits. The specimens were then mounted in bakelite (Lucite) and then care-

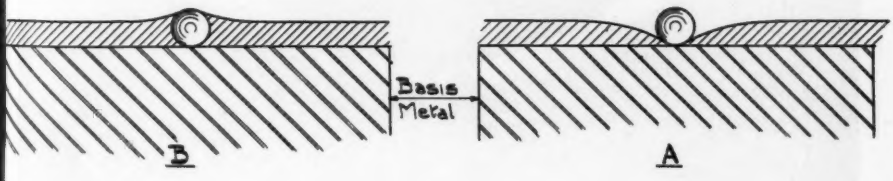
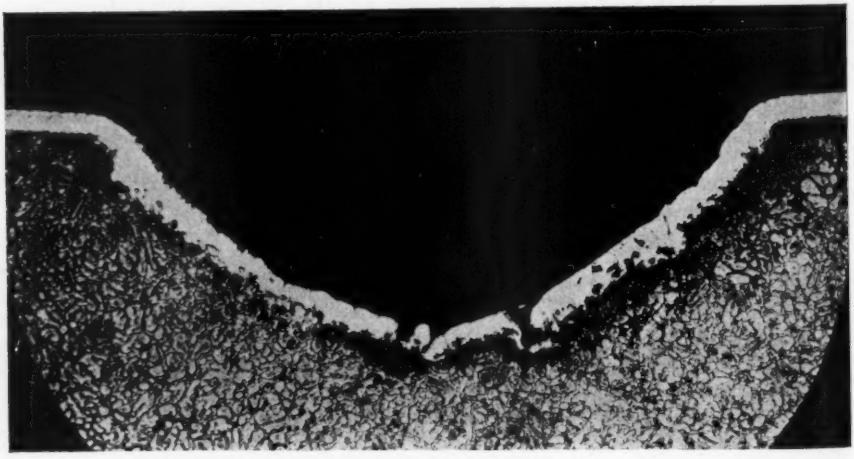


FIG #1

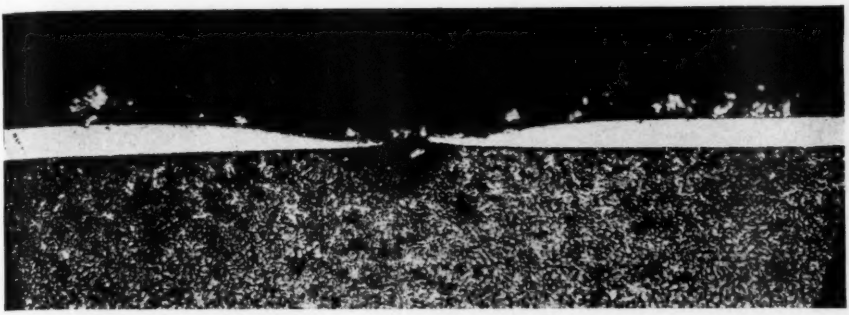
fully polished back until the polished face was a plane running almost exactly through the center of a pit. The results were some typical examples of pits. These are shown in Figures # 2, # 3 and # 4.

In Figure # 2 it is clear that the pit is due to a pit in the basis metal, in this case about .004″ deep and about .010″ in diameter. The plate is of approximately the same thickness at the bottom of the pit as on the unpitted portion of the metal. The plate likewise follows the contour of the pit in the metal. It is plain that this pit must have been present prior to the start of the plating operation.

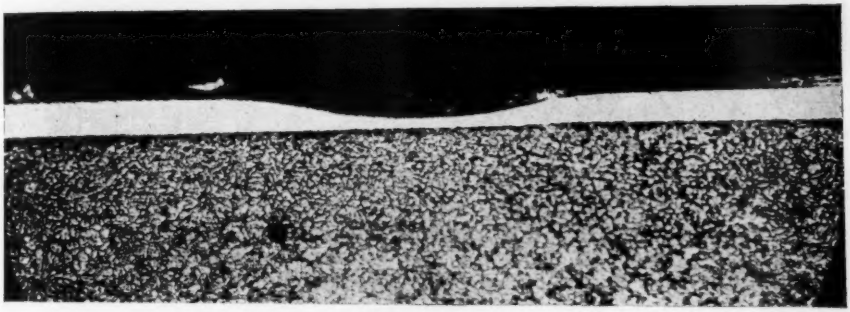
On the other hand in Figure # 3 the nickel plate does not follow the contour of the pit which can be seen as the dark spot immediately beneath the perforation in the plate. This shows clearly a pit of the type illustrated in Figure # 1 "A." A hydrogen bubble has clung to the surface of the basis metal causing an interference with the passage of current at that spot and the consequent tapering off of the plate as shown. At the immediate center of the pit the point at which the hydrogen bubble actually touched the basis metal deposition has been completely prevented. The actual corrosion of the die-casting as shown, we believe, occurred because of the pit (perforation), that is, the hole in the plate permitted the attack of the basis metal.



 # 2 × 500 DIA.



#3 × 500 DIA.



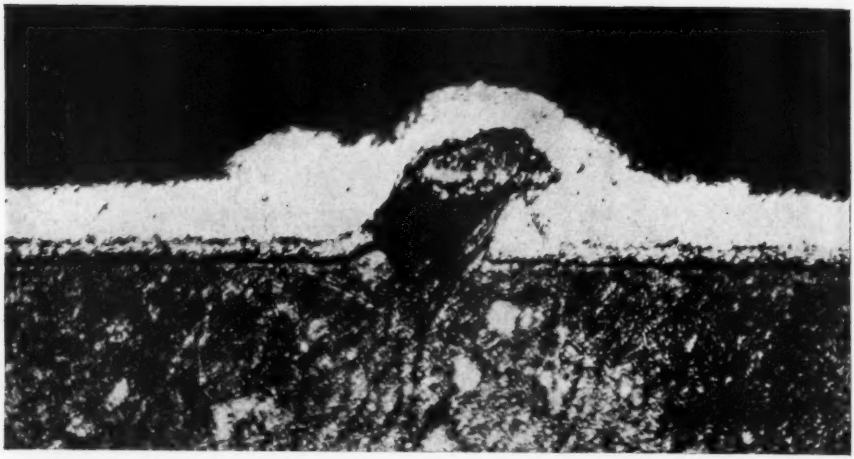
#4 × 500 DIA.

Figure #4 is much the same as #3 except that either it was not polished through the exact center of the pit or the hydrogen bubble did not attach itself to the surface until some plate had been deposited.

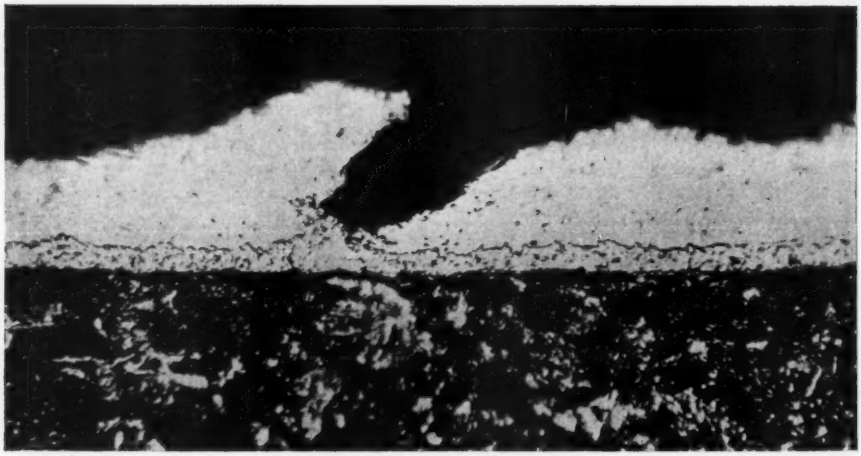
Having gone this far in writing this up we thought that we might as well go a little further and complete the set, that is, we plated some pieces to the surfaces of which particles of steel were clinging.

Pieces of bars were magnetized and steel filings were dropped on these, some just as the bar entered the copper, and some just as the bar entered the nickel, that is, on top of the copper.

Figures #5 and #6 show the type of pit or spot caused. You will note that in general these conform to the type shown in Figure #1 "B." These particles being metallic and conductors the nickel



#5 × 750 DIA.



#6 × 1000 DIA.

has plated on and around them. If they had been buffed so that the high spots had been cut off and the pit or particle exposed they would have still more resembled Figure #1 "B." In Figure #5 the steel filing can be seen touching the steel, whereas #6 shows that the particle was dropped on after the copper had been deposited. In #6 only the cavity where the particle had been

can be seen. The particle has been polished out in preparing the specimen.

In looking these photographs over please remember that it was rather difficult to get just what we wanted as our time was limited. We have other things to do. We hope, however, you have found them worth your time.

Editor's Note: This is the first response to our plea to members for items of interest. There are lots of you fellows who can do better than this. Let us hear from you.

NOTED AUTHORITY ON CHEMISTRY WAS IN HIS 54th YEAR

Dr. Earle Kenneth Strachan, associate professor of chemistry at Brown University, and a nationally known authority in the field of industrial chemistry, died suddenly November 21, at his home, 217 Eighth Street, Providence, R. I. He was in his 54th year.

Dr. Strachan became known especially for his research work in organic chemistry and the development of new methods in the analysis of dyes. He was called in frequently by industrial concerns on industrial chemistry and electrochemical problems and wrote extensively for national scientific publications.

He had been a member of the Brown University faculty since 1922 when he was made assistant professor of physical chemistry. He became associate professor in 1932.

In addition to his regular classroom work at Brown, Prof. Strachan taught numerous extension courses at the university in the electrochemical field and took an active part in the extracurricular activities of the university. He was a member of the Board of Managers of the Brown Union and secretary and member of the board of the Faculty Club.

Prof. Strachan was born in Brockton, Mass., May 15, 1886, the son of James W. and Susie L. (Bowen) Strachan.

He was graduated from the Worcester Polytechnic Institute in 1908 and received his master of science degree from the University of Illinois in 1910. Two years later he achieved his doctor of philosophy from the same university.

Dr. Strachan taught for eight years at the University of Illinois before becoming associated with the research department of the National Aniline and Chemical Company of Buffalo, N. Y., from 1916 to 1922. It was during this time that he conducted his successful experiments in the analysis of dyes. He came to Brown directly from this position.

Dr. Strachan was a member of the American Chemical Society, the American Electro-chemical Society, the American Institute of Chemical Engineers, the American Electroplating Society, the Providence Engineering Society. He served as chairman of the Rhode Island section of the American Chemical Society several years ago and was a member of the committee on industrial instruments of the American Society of Mechanical Engineers.

He was married on June 14, 1913, to Lela Mildred (Wright) Strachan, who with two sons, Richard Wright Strachan and Earle K. Strachan, Jr., survive him. He also leaves one brother, Ralph W. Strachan of Brockton, and his mother.

Funeral services were held at St. Stephen's Church, where he was a vestry man, on Friday, November 24.

Business and Social News

BRANCH NEWS

Educational Activities

Hartford Branch. The Hartford Branch of the A.E.S. held its regular monthly meeting on Monday evening, November 20, 1939, at the Elks' Club, Bristol, Conn.

The meeting was called to order at 8:00 P. M., with President Backus in the chair. Minutes of the previous meeting were read and accepted. One communication was read and placed on file. No bills were presented.

One applicant, Mr. John G. Poor of the Underwood, Elliot and Fisher Co., of Hartford was elected associate member.

Mr. W. J. R. Kennedy gave a very interesting account of some of his branch visitations of the past month, including a visit to the Toronto Branch of Canada. Hs spoke of the growth of the society, and of the many changes taking place.

Through Mr. Kennedy, many of us became acquainted with the news of the death of one of our most prominent and beloved members, Mr. Oliver J. Sizelove, who has contributed so much to the advancement of the society. Our heartfelt sympathy goes out to the family in their bereavement.

Under "new business," a committee composed of Mr. Peterson, Mr. Beloin and Mr. Austin was appointed to bring in a report as to the possibility of a branch paper for the coming convention to be held in Dayton next June.

Mr. Joseph Downes, foreman at the Remington-Rand Co., of Middletown, Conn., and second vice-president of the Supreme Society, gave us a very fine talk on "Black Nickel Plating." His talk covered some of his own personal experiences over the last decade, many of them humorous, as well as otherwise. His talk was very interesting and instructive, as was the discussion which followed. We also appreciated the frank easy manner in which he answered all of the questions asked. We are very much indebted to Mr. Downes for his very nice talk. In conclusion he was given a rising vote of thanks.

The members attending this meeting were pleasantly surprised by the serving of a light lunch which was donated by the Chemical Corporation, through their salesman, and associate member of the branch, Mr. Kenneth Bellinger. Many thanks to the Chemical Corporation for their interest and kindness.

The meeting was attended by thirty-six members and visitors and adjourned at 11:30 P. M.

VERNON E. GRANT, *Secy.*

New Haven Branch. The November educational session was held on Tuesday evening, November 21, at the Sterling Chemistry Laboratory of Yale University. The guest speaker was Mr. J. D. Tierney, of the Storts Welding Co., Meriden, Conn., who gave a very interesting and informative talk on "Some of the Influences Affecting the Use of Spray Rinsing Facilities." Following the lecture itself, the meeting adjourned to the Industrial Laboratory, where there were set up several of the different types of spray rinse tanks. Mr. Tierney explained their operation and everyone was given an opportunity to try out these tanks.

The second meeting of the course in metallurgy was held Tuesday, Novem-

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2. Shorten rinsing time up to 65%?
3. Rinse your work more effectively?
4. Minimize spotting and staining?
5. Eliminate "carry-over" contamination?
6. Cut your alkali and acid costs?
7. Reduce number of rinse tanks?
8. Decrease Sewage Pipe Loads?

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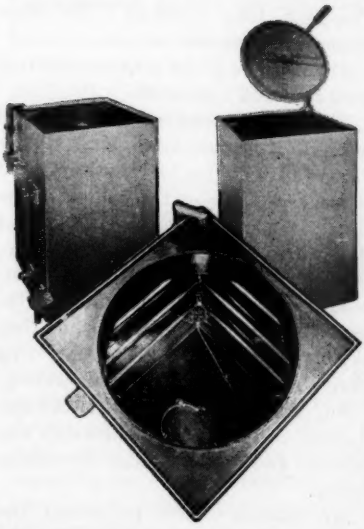

STORTS WELDING COMPANY

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ber 28, with Mr. Thelin, metallurgist at the Chase Brass & Copper Co., giving the talk. Some seventy-five people are taking this course, and it promises to be a great success.

Preliminary arrangements were made for a Christmas party for the New Haven Branch at the Hejaz Grotto on Saturday evening, December 16. This was a stag affair, and the boys enjoyed an evening of sport, including bowling, pool shooting, plus a fine meal, and some New York vaudeville a la Charlie Koelbl.

JOSEPH T. SULLIVAN, *Librarian*

Newark Branch. The regular meeting of the Newark Branch, A.E.S., was held on Friday evening, November 17, 1939, at the Club Room of the Hotel Douglas, Newark, N. J. The meeting was called to order at 8:30 P. M., by President John Kotches. All other officers were present.

The minutes of the previous meeting were read and approved.

The secretary announced that he had received a letter from the Master Platers' Association of New York with reference to a banquet to be held at the Hotel Delmonico, Park Avenue and 59th Street, New York, on Saturday, December 16, 1939. He further informed the members that he had received 20 tickets at $4.00 each and that anyone who wished to attend this affair should see him after the meeting.

An application for Mr. Adolph Bialecki to Associate Membership was received and voted to take the regular course.

Mr. Horace Smith performed the unpleasant duty of announcing the death of our good friend and fellow member, Mr. Oliver J. Sizelove, who passed away just a few hours before this meeting. The members stood for a few minutes in silence, in tribute to him for whom we all held the highest regard. Mr. Smith then stated that the funeral services would be conducted on Sunday evening at 8 P. M., at the funeral parlors of Haeberle and Barth, Clinton Avenue, Irvington, N. J.

Mr. Louis Donroe, acting librarian, next presented Mr. W. A. Helbig of the Darco Corporation as our guest speaker for the evening. His subject was "The Use of Activated Carbon in Electroplating Solutions." Mr. Helbig's talk dealt with the clarifications and purifications of plating solutions through the medium of activated carbon. He illustrated its effect by running a quantity of treated solution and a quantity of untreated solution through two filters into two separate beakers. The result was very pronounced. Mr. Helbig was asked numerous questions as to the effect of activated carbon on

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wetting agents and brightening agents in plating baths, which he answered to everyone's satisfaction. He was given a rising vote of thanks by the forty-seven members present.

Meeting adjourned at 11 P. M.

GEORGE WAGNER, *Secy.*

Chicago Branch. The regular monthly meeting of the Chicago Branch was held on November 11, 1939.

President J. W. Hanlon presiding and all other officers present.

Communications read and acted upon by the Branch.

Application of Mr. E. O. Johnson accepted to membership.

Mr. O. E. Servis reported that the suggestions submitted to the Research Committee would be considered by them at a meeting in December.

Mr. H. A. Gilbertson reported that the Banquet Committee was making progress with the preparations for the 1940 banquet.

Supreme President R. Goodsell addressed the Branch and mentioned that the Milwaukee Branch meeting nights would be changed.

The meeting was turned over to the librarian, Mr. O. Weickmann, who found the following questions in the Question Box.

Q. What are the best conditons for the prevention of rough deposits and sediment in an acid copper solution?

A. Continuous filtration, or the use of molasses as an addition agent.

Q. What is the minimum current densities used in electric cleaning.

A. For brass 25 amps. per sq. ft., and for steel 50 amps. per sq. ft.

After the Question Box Mr. Weickmann read a complete conclusion to the paper read at the 1938 convention by Messrs R. M. Wagner and M. M. Beckwith entitled "Rochelle Salt Cyanide Copper Baths."

M. H. LONGFIELD, *Secy.-Treas.*

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Anderson Branch. The Anderson Branch of the American Electroplaters' Society held their regular monthly meeting at the Anderson Y.M.C.A. on November 14, 1939, at 6:30 P. M.

Mr. H. L. Benner of the du Pont Company gave a very interesting talk on the new Moly-black process recently developed by his company. After the talk many questions were discussed regarding the future possibilities of the new bath and many possible uses were suggested for it.

There were several guests present from neighboring towns including Indianapolis and Shelbyville, as well as several from Anderson.

The following questions were found

in the Question Box and each was discussed at some length.

Q. How does the current density used in bright zinc barrel plating compare with that used in cadmium barrel plating?

A. Bright zinc requires considerably more current to produce the same thickness of deposit.

Q. How would you keep black nickel from staining when drying off?

A. Use small amount of whale oil soap in final rinse, then tumble in sawdust.

There was a business meeting held after the discussion and several matters of business were discussed including the election to membership in the Anderson Branch of John Douglas and Rex Oyler both of whom are employed at the Guide Division of General Motors in Anderson.

Since there was no further business the meeting was adjourned at 9:15 P. M.

OTTO W. MCCALLISTER, *Secy.-Treas.*

Los Angeles Branch. The Los Angeles Branch of the A.E.S. held their regular monthly meeting November 8, 1939, at the Rosslyn Hotel.

President Ray Bray called the meeting to order at 8 P. M.

Minutes and financial report of the previous meeting were read and accepted. Bills were read and ordered paid.

Mr. F. H. Kienzle of the Braun Corporation read a very interesting paper on the uses of activated carbon in the plating industry.

Bob Gripp, former past president of the Los Angeles Branch, was present at the meeting.

The following questions were found in the Question Box:

Q. What is a good formula for pickling 18-8 *stainless steel after being annealed at* 1950°*F.—to be electrically pickled?*

A. 25% sulphuric acid — pickle at 180°F., or 20% nitric acid—pickle 140°F.

Q. Can a lead-lined steel tank that has been used for chrome plating be used as a plating tank for acid copper.

A. Yes, by treating the tank with hydrochloric acid first.

The business session came to a close at 10 P. M. and the meeting was turned over to the Whoopie Committee who had arranged a pleasant evening of entertainment for all.

RAYMOND SOLIVAN, *Secy.-Treas.*

Pittsburgh Branch. The regular meeting of the Pittsburgh Branch was held Friday evening, December 1, at the Bureau of Mines Building. Messrs. Clyde C. Cupps and Dorald W. Stoner of Standard Steel Spring Company were elected to active and associate memberships respectively. Application for associate membership was received from Mr. William J. Hennessy of the Pennsylvania Salt Manufacturing Company.

The death of one of our Branch's charter members, Mr. Clarence Eggleston was announced by Mr. Hedden.

Mr. Taylerson asked the Branch if they had any suggestions to offer the Research Committee for the program for the coming year. He announced the present program is about complete and action was taken at the next meeting, December 8, toward outlining the future program. It was moved and seconded to send the suggestion of Mr. R. A. Dimon as a Branch proposal that the "Research Committee give consideration to studying, improving, and standardizing methods of making porosity tests of electrodeposited coatings on various base metals."

Dr. C. J. Wernlund of the Niagara Falls Laboratory of the E. I. du Pont Company presented a paper on "Fifty

Years of Progress in Electroplating of Zinc." Dr. Wernlund gave the history of zinc plating, elaborating upon the improvement in cyanide zinc plating during the last twenty-five years. He concluded his paper by giving a resumé of the characteristics of various zinc plating baths as used today. One of the greatest improvements in zinc plating is the use of high purity zinc anodes which permit the plating at very high current densities from acid baths as in the Tainton process, and the plating of bright zinc from cyanide baths. One of the important things brought out by Dr. Wernlund is the result of exposure tests at New York City and Sandy Hook as reported by "Burns and Schug." Zinc plated samples at Sandy Hook showed no failures in a period of time while samples in New York City about twenty-five miles away showed 50 to 75% rust during the same period. The sulphur dioxide in New York City atmosphere caused the more severe test in that locality.

The next meeting will be held January 5, 1940.

FRANK R. KELLER, *Secy.*

Dayton Branch. The regular meeting of the Dayton Branch was held at the Engineers Club on Friday, December 1.

The application of Mr. Julius Teres was read and voted to take the usual course. The following men were elected to membership in the Dayton Branch: Mr. W. A. Hopkins of the Electric Auto-Lite Co., Springfield, Ohio, Mr. Chester Lancaster of the Buckeye Bumpers Co., Springfield, Ohio, Mr. Stephen C. Putzan of the Buckeye Bumpers Co., Springfield, Ohio, and Mr. William Neill of the Columbus Metal Products Co., Columbus, Ohio.

Arrangements were made for at least ten members of the Dayton Branch to attend the educational session and banquet of the Detroit Branch next Saturday, December 9.

There being no further business the meeting was turned over to Mr. Luechauer who introduced our speaker, Mr. H. L. Benner of the du Pont Company.

Mr. Benner's subject was on "Moly-Black," the new molybdenum nickel plating process for producing a black finish. Samples were passed around and slides were shown of the many articles that are being plated in this rather unique bath.

At the close of the discussion following Mr. Benner's talk he was given a rising vote of thanks and at this time our meeting was adjourned until the first Friday in the new year.

CORLISS W. POWELL, *Secy.*

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3.6—5.0 (nickel)	8.2— 9.7
3.7—5.3 (zinc)	9.2—11.0
1.9—3.4 (copper, nickel)	(brass, copper,
0.9—1.5 (copper, etc.)	silver)
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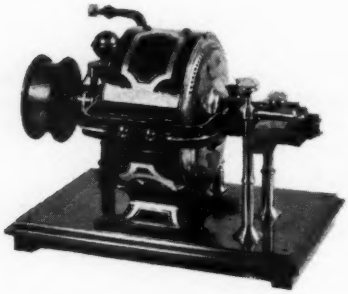

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The knowledge, skill and foresight of the very start of generator plating, as well as the same pride of workmanship, have been

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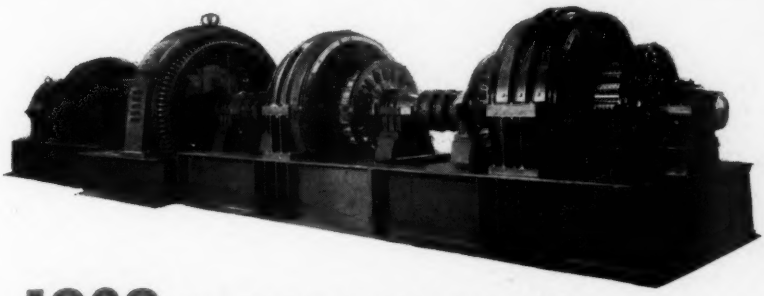

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Cincinnati Branch. The regular monthly meeting of the Cincinnati Branch, American Electroplaters' Society was held in the Hotel Metropole, Thursday evening, November 30, 1939, at 8:00 P. M. The minutes of the previous meeting were approved as read.

A letter was read from Mr. George B. Hogaboom, who will speak before our Branch February 1, 1940. A motion was made and seconded that we change our regular January 26 meeting to Thursday, February 1, in order that we may hear Mr. Hogaboom. His subject is to be "Some Overlooked Problems in Electroplating."

Mr. Towner gave an outline of the paper that is to be presented before the Branch at our December meeting.

The secretary was instructed to notify three members of their election into the Cincinnati Branch.

MARTIN GANNON, JR., *Secy.*

Rochester Branch. The Rochester Branch held its regular monthly meeting on Friday night November 17. We had as our guest speaker, Mr. LeRoy Sullivan of the Divine Brothers Company whose topic was "Some Pertinent Facts about Glue and Polishing Wheels." He stressed the point of selecting the correct wheel for each type of work, making sure of the correct flexibility and ductility for the most efficient results. He described the different types of wheel such as bullneck, felt, walrus hide and cloth, giving some very important data to remember about each type of wheel. The balancing of wheels was also made a very vital point for best results. and the necessity of using the proper type of glue at all times. He also reiterated his statements made at a former date concerning the handling of glue, such as not heating too highly, not using glue after it has stood for some time and the correct consistency. After the talk he was besieged with numerous questions which kept him busy answering for some time. Mr. Sullivan was then given a rising vote of thanks and invited to come again soon.

During the meeting Mr. Ray Berghold received a telegram from Mr. Fred Gumm telling of the passing of our old friend and colleague, Mr. Oliver Sizelove. It is with a great feeling of regret and sincere sympathy that we hear of this loss. To the family of Mr. Sizelove we extend our heartfelt condolences.

The application of Mr. Louis J. Hept as an active member was read and he was duly elected.

JUDSON R. ELSTER, *Secy.*

Toronto Branch. The regular meeting of Toronto Branch was held at King Edward Hotel the first Friday in

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December with Vice-president H. A. Smith acting as chairman. One application was received for membership and after the regular routine of business, the members settled down to the reading of the Branch notice sent out by Secretary Allen Byres, as "headache problem night" everybody had to bring a sample or a problem that gave them a headache to plate, but before we could begin on the samples the talk got around to the trip to Buffalo so away we went; we found the meeting hall easier the second time, but it was quite a trip, the night was wet and the wind was so strong it nearly blew us over the Peace Bridge.

At this stage Mr. Smith had to call the meeting to order and asked Bill Price to demonstrate his headache problem, his sample was a bunch of bent wires like a half moon and then bent inward at the ends, these wires were used as hangers for dusting brush handles. They could not be plated in a plating barrel as they bunched up and got into a knot so that only the outside wires were coated with nickel. The next one was Jack Walker with a pair of dentist forceps and he stated that they were a headache to plate as they could not be plated in the slots when closed. J. S. Cairns was next with samples of speed skates, hockey and figure skates —nickel plated and buffed, also satin finished. Mr. Cairns was complimented for his fine samples and apparently had no problem but if any of the members ever want a real headache, all they have to do is to get into the skate business. Mr. Smith was complimented for his paper that he gave in Buffalo. Mr. Mundy of Hamilton took a great interest in all the samples that were on display and giving expert advice in detail proved himself to be a worthy member. Thank you, Mr. Mundy. Chairman Smith in closing the last meeting of this year wished all the members the compliments of the season.

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The members would like to know where President Acheson, Tom O'Keefe, Jim Graham, Alex Armstrong and Jack McClean were on the night of December first.

Q. *How can I plate those bent wires in a barrel without the wires bunching up?*

A. Plate with the burnishing balls mixed with the wires.

A. Make rack with lots of prongs, throw wires on prongs and plate in still tank.

Q. *How can dentist forceps be chrome plated all over and also in the slots?*

A. Plate closed, take out and open forceps and plate the second time, rinsing only the second time.

Meeting adjourned at 10:45.

J. S. CAIRNS, *Secy.*

Waterbury Branch held its regular

monthly meeting on Friday, December 8, at the Hotel Elton. The informal dinner which precedes the meeting was served at 6:30 and an excellent meal was enjoyed by those able to attend.

The regular meeting was called to order at 8:00 P. M. by Vice-president Ralph Colter who turned the meeting over to William Gray, technical chairman, for the evening. Mr. Gray did a bang-up job of presenting the guest speaker of the evening, Mr. R. M. Shields of the Duriron Company.

The subject, "The Advantages of Duriron in the Handling of Electroplating Solutions," was simply and clearly presented, aided by pictures showing Duriron pumps, heat exchangers and other equipment in actual service in plating rooms.

Dr. Dubpernell brought to the attention of the meeting that the "Metals Handbook" of the American Society for Metals contains an extensive section dealing with the finishing of metals, including electroplated and other metallic coatings.

The meeting adjourned at 10.30 p. m.

GEORGE MUSICO, *Secy.*

Buffalo Branch met at the Bowling Academy on December 8 with President Joe Ruff in the chair. The minutes of the previous meeting were approved as read.

Our librarian, Dr. Wernlund, had very wisely decided not to engage a speaker for this meeting in order that the members might have an informal evening in which to discuss business, with a view to helping the general welfare of the branch. The success of the previous meeting in which the Toronto Branch had been so well represented received much favorable comment. It was tentatively agreed that we should pay Toronto a return visit in April or May of next year. Many helpful suggestions were made and will be acted upon with beneficial results.

The meeting adjourned at 10.30.

A talk will be given next month by Mr. G. Soderberg on "Bright Nickel," and with the reputation this speaker has, we expect a record attendance.

RODERICK MCGHEE, *Secy.*

Cleveland Branch. The Cleveland Branch held its regular meeting on Saturday evening, December 2, in Parlor 31, of Hotel Cleveland.

The application of Bernard John

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Kubrak for associate membership was read and referred to the Board of Managers. Mr. Kubrak is employed by the Cleveland Welding Company.

Mr. Gerald Rosing presented his transfer as an associate member from Toledo Branch and was welcomed into Cleveland Branch by President Matts.

Chairman Scott of the Silver Jubilee Committee gave his final report on the party held November 11. The figures showed a small deficit. In view of the good food and splendid entertainment provided, this amount was considered very small. In making his report Mr. Scott acknowledged the assistance rendered by the Puro Chemicals Company in providing the printed programs and by the Hanson-Van Winkle-Munning Company in providing the souvenir balloons. Serving with Mr. Scott on this committee were Mr. Singler and Mr. Binder. The committee was discharged with the deep appreciation of the Branch.

The poll of the membership with regard to meeting night showed the following: Number of cards sent out, 70; number of cards returned, 44. For first choice — Saturday, 15, Friday, 15, Tuesday, 14; for second choice — Saturday, 11, Friday, 26, Tuesday, 7. As only forty-four cards had been returned and the result was so close, it was decided to hold this matter over for the January meeting.

Mr. Fridl spoke briefly on his visit to Pittsburgh Branch, and suggested the idea that Pittsburgh and Cleveland Branches should exchange meetings. The idea was well received and was held over for further discussion.

President Matts called attention to the passing of Mr. Oliver Sizelove. He expressed the feelings of the Branch on the death of Mr. Sizelove, who was well known and regarded by Cleveland members.

Librarian Hull introduced the speaker of the evening, Mr. J. S. Nachtman, a well-known member of Cleveland Branch. Mr. Nachtman read a most interesting and instructive paper on the Electro-tinning of Steel Strip. He quickly demonstrated his knowledge of his subject and when finished was bombarded with many questions. His clear answers brought the applause of his audience.

Mr. Hull announced that Mr. William Phillips of General Motors Corporation would speak at the January

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meeting on "Impressions of European Plating Practice." At the February meeting Mr. George B. Hogaboom, of the Hanson-Van Winkle-Munning Co. will speak on "Some Overlooked Problems in Electroplating."

P. R. LYONS, *Secy.*

Springfield Branch of the A.E.S. held its regular monthly meeting at the Hotel Charles on November 27 at 8:00 P. M. Twenty-seven members and guests were present. The meeting was called to order by President Costigan.

Mr. Kennedy informed the society that our good friend and fellow member, Oliver Sizelove, had just passed away and suggested that the secretary write Mrs. Sizelove and convey the sympathies of the Branch.

Mr. William Seidel was appointed chairman of the Papers Committee and will direct work on the paper the Branch is going to present at the Dayton Convention.

Because Christmas falls on the fourth Monday of December it was unanimously voted to hold the December meeting on the eighteenth. Mr. Seidel is chairman of the Program Committee for that month and has agreed to try and secure Mr. George Hogaboom as the speaker.

Mr. W. J. Kennedy introduced Mr. Ernest Bancroft, metallurgist of Pratt & Whitney in Hartford, Conn., who spoke on "Hard Chromium Plating." He explained the methods employed at the Pratt & Whitney Company, the use of special anodes, methods of preparing the metal, and the process of finishing the plated tool.

Mr. Bancroft's talk was illustrated with samples of the plated work which made it interesting and comprehensive.

Following are a few of the questions which were fired at him:

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Nickel Plating Solution

1. If you plate **ZINC DIE CASTINGS.**
2. If you wish to plate **ALUMINUM.**
3. If you have some complicated shapes to cover.
4. If you plate articles made of several pieces soldered together and want to cover the solder.
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Q. What solution concentrations are employed for hard chromium plating?

A. Either the 250 g./l. or 400 g./l. solution may be used.

Q. What factors influence the choice of acid used in preparing the basis metal?

A. Muriatic acid is usually used except for alloy steels and cast iron where sulphuric acid is employed.

Q. What type of wheel is recommended for grinding the chromium to size?

A. A Norton 3880-J wheel is used. The speed and cut however must be less than that employed on tool and high-speed steels.

Q. At what temperature is hard chromium plated?

A. For flash plating, and for plating irregular shapes a 400 g./l. solution at 113° F. is used. For heavier deposits and work requiring conforming anodes

the 250 g./l. solution at 130° F. is better.

Mr. Bancroft's talk and discussion was thoroughly enjoyed and he was given a rising vote of thanks.

The meeting was adjourned at 10 P. M.

D. S. HARTSHORN, JR. *Secy.-Treas.*

Toledo Branch held its regular meeting, November 2, in Room 224 of the Vocational High School, on Monroe Street, Toledo, Ohio. The meeting was called to order at 8:45 o'clock by the president, Mr. Miner. A letter from the Dayton Branch, concerning papers for the 1940 convention was read, and after some discussion, the chair appointed Mr. Ward Hunlock as chairman of a committee to study the matter, and come to some agreement as to the subject-matter. Mr. Hunlock was asked to select his own coworkers.

An announcement was made that the Detroit Branch of the A.E.S. would hold its annual banquet, and educational session on Saturday, December 9, at Hotel Statler, Detroit, and every member who could attend was urged to do so.

An application of Mr. Charles I. Ennis for membership in the Toledo Branch, as an associate member, was read, and upon motion of Mr. Weiker, which was seconded by Mr. Schuldt, was approved. Mr. Joseph C. Fox of the Doehler Die Casting Company applied for membership as an active member.

Plans for a social meeting to be held at the home of Mr. Schuldt, on Friday night, December the fifteenth, were made.

Mr. May, the educational chairman, announced that he had the following speakers engaged to speak before the Branch at future dates: Mr. Johnson, from the Belke Manufacturing Company is to talk on rack insulation in December, in January Mr. Opplinger from the du Pont Company, in February Mr. Beauer on barrel finishing, and Mr. Klaas is to talk on automatic polishing and buffing, in March.

At this time the chair introduced the speaker of the evening, Mr. Lewis, who read a very interesting paper on anodic cleaning of die-casting. The subject matter was very thoroughly discussed at the close of the paper, at the end of which Mr. Lewis was given a vote of thanks for his contribution to the advancement of the science of electroplating. Meeting was adjourned at eleven o'clock.

GASTON BERGEMAN, *Secy.*

New York Branch held their regular monthly meetings for November and December at their headquarters in the Hotel Pennsylvania.

On Friday, November 10, they held a short business session, which included the offering of a resolution by the membership commending the Supreme Society and the executive secretary, W. J. R. Kennedy, for the publishing and distribution of this year's copy of the Convention Proceedings. It was a fine achievement, one worthy of commendation and a place in our library. The educational feature at this meeting was presented by Mr. Edwin C. Rinker of Oakite Products Corporation, who gave a very interesting and informative talk on the "Preparation and Cleaning of Metals Prior to Electro-Plating." Mr. Rinker, one of our own boys, went into his subject thoroughly and held the interest of the membership for an hour and a quarter with much lively discussion. Ed was tendered a rising vote of thanks by the Branch at the conclusion of his talk.

On Friday, December 8, the Branch held their last meeting of the calendar

year. After a brief session of business the Branch librarian, Dr. C. B. F. Young, provided the monthly feature of the educational program for the membership by again presenting the subject prepared for the past convention program, namely, "The Use of Wetting Agents in Nickel Plating Baths." This upon request of the membership to have read and illustrated the work done by the Branch members on the Branch Paper presented at the Asbury Park Convention. Dr. Young was accorded a vote of appreciation by the membership and visitors present for his talk and illustrations.

There were six applications for membership filed at these meetings and these were referred to the Committee for Progress. There were three elections to membership.

The meeting was adjourned at 10.00 P. M. to allow the members and guests to enjoy a pre-Christmas party, with refreshments and good fellowship until midnight.

The Branch extends to the Supreme Officers of the A.E.S. and all its fellow branches, its sincere wish for a Happy Yuletide and Prosperous New Year.

F. J. MAC STOKER, *Secy.*

Grand Rapids Branch. The regular meeting of the Grand Rapids Branch was held November 2 and was well attended. The meeting was called to order by President Werft. After a brief business session, our president introduced our old friend, Mr. George B. Hogaboom, our speaker for the evening.

Mr. Hogaboom started his talk with a resumé of the advances in electroplating.

Zinc is now plated at 1000 to 1500 amps. per sq. ft. Hanson-Van Winkle-Munning are now building a 16 volt 90,000 amp. generator to be used on zinc plating. Electroplated zinc, according to Mr. Hogaboom, gives three times the service that hot dipped zinc gives. He mentioned a new silver-lead insoluble anode used in a new process of plating zinc on fence wire directly from the ore.

Tin is now plated at very high current densities at 400 feet per minute on wire.

Copper, in phonograph record manufacture, is now plated at 1000 to 12,000 amps. per sq. ft. News reels are in theaters with sound recordings four hours after football games.

He predicted that nickel will be plated at 100 to 125 amps. per sq. ft.

Stainless steel is now giving plating the competition we first thought it would. It did indirectly help to push research in electroplating. Plastics are used much in Germany but many of them are now plated.

As to plating solutions and their troubles, it is surprising that we don't have more trouble considering how some solutions are abused. The old solutions were controlled only with litmus, when the fault is with poor preparation or poor stock. Mr. Hogaboom himself helped improve the quality of stock to be plated when he published his article on "What is Under the Plate."

Specifications, says George, mean nothing unless methods of producing the finish are given. Cleaning methods differ much while the definition of a clean surface, "lack of water breaks," does not tell the whole story.

Tests for quality of plating are not adequate. Salt spray and drop tests are not perfect tests because they do not take into consideration the character of the deposit. We talk too much of results and too little about how to get those results. The cause is the important thing. Solution control helps but it is only one factor. The microscope is the only good method of measuring thickness of the plate but the piece must be destroyed. The average thickness of the plate is of no importance. Weakest spot (point of least plate) is the important thing.

In computing current densities, the areas of articles must be known. This later is often almost impossible to find, especially on intricate designs and irregular shapes. A fact not generally realized is that a sand-blasted surface has several times the area of a smooth surface.

It is a common fault to watch the cathode and pay little or no attention to the anode. The condition of the surface of the anode is very important; the products of electrolysis must be dissolved to obtain good results. Anode areas should be adjusted to give best anode current densities for solution of products of electrolysis. There is very little literature on anode current densities.

Current distribution plays an important part in obtaining satisfactory results. Mr. Hogaboom has found the "Tong Tester" a very useful piece of equipment in studying current densities on plating racks. Many troubles causing variations in current can be detected by the "Tong Tester." If the current density on different pieces varies between too wide limits in semi-automatics, there may be reversed polarity with resultant peeling. Too low current densities often favor plating out of impurities on the cathode and allow reversed polarity which in turn may cause impurities to enter the solution. At high current densities, coloids are often plated into the cathode causing brittleness of deposit.

Throwing power has never been properly defined. Poor throwing power is not always fault of solution. Many different methods of measuring throwing have been suggested and all have their faults. Pan, Piersol, Hull and Harring have all published methods.

In some solutions, even with the optimum current densities, polarization will occur unless the solution has addition agents to help dissolve the products formed at the anode. A study of these addition agents will aid in obtaining better results.

Mr. Hogaboom concluded by speaking at length on convection currents in plating solutions. These later are what cause most cathode surfaces to plate heavier at the bottom while anodes corrode more at the bottom (and at the solution line) due to convection currents bringing more free cyanide to these points.

Mr. Hogaboom was given a vote of thanks and an invitation to visit Grand Rapids Branch again.

CHARLES S. WHALLEY, *Secy. Treas.*

THIRD ANNUAL BANQUET OF GRAND RAPIDS BRANCH

The Third Annual Banquet and Informal Dinner Dance will be held January 20, 1940, at 7 o'clock

Hotel Rowe Grand Rapids, Michigan

Educational Session, 2 o'clock.

Prof. E. M. Baker from the Department of Chemical Engineering, University of Michigan, Ann Arbor.
Subject: Cause of Pitting in Electrodeposition of Nickel.

Dr. D. T. Ewing, head of the Department of Physical Chemistry, Michigan State College, East Lansing.
Subject: Physical Chemical Method for Control of Plating Processes.

Mr. Burt Lewis of Northwest Chemical Company, Detroit, Michigan.
Subject: A New Method of Cleaning.

Here and There

PHILADELPHIA BRANCH EDUCATIONAL SESSION AND BANQUET

The Philadelphia Branch annual meeting was held on Saturday, November 18, at the Stephen Girard Hotel, Philadelphia. President Joseph Underwood welcomed the 150 members who attended the session and introduced Dr. A. K. Graham as the chairman of the meeting.

Dr. Louis Weisberg of New York was the first speaker, his subject being "Rapid Plating of Heavy Nickel Deposits." This paper is published in this issue of the REVIEW. Mr. Floyd Oplinger of E. I. du Pont de Nemours and Company spoke on "Modern Tin Plating Practice from the Sodium Stannate Bath."

Dr. Blum's subject was "Specifications for Electroplating non-Ferrous Metals," and Mr. George B. Hogaboom of the Hanson-Van Winkle-Munning Company told of some overlooked problems in electroplating. All four speakers were listened to with the closest attention and were warmly applauded at the close of each address.

The banquet at seven o'clock was well planned, without delay or confusion. There were nearly 350 present. This was the most largely attended event ever conducted by the Quaker City Branch. A genuine feeling of good fellowship prevailed throughout. A bang-up good floor show followed the banquet, each act receiving rounds and rounds of applause. Dancing was enjoyed into the early hours of the morning.

SOME OF THE HIGHLIGHTS

Dr. Kenneth Graham handled the Educational Session splendidly. He makes an ideal chairman.

There was much discussion of an interesting and educational nature after the reading of each paper. It was one of the best sessions we have attended for a long time. This was the concensus of opinion by all present.

Towards the close of the Educational Session, Dr. Graham called for a moment of silence in memory of our deceased brother, Oliver Sizelove, whose death was deeply regretted.

The thirty or more companies who presented prizes to be distributed to the lucky ticket holders deserve the highest commendation. The prizes were handsome, useful and costly. There was considerable applause at each table, when the winner's number was called.

Lancaster, Reading and other towns outside of Philadelphia were well represented at the meeting. Many members of other branches of the A.E.S. were also present.

The officers and members of Philadelphia Branch are to be congratulated for the well balanced program presented and for the earnest endeavor on the part of the committee to make this an outstanding event from year to year.

The Annual Meeting of Detroit Branch. Looking back over the years since the society was organized, we find that the social spirit has always been fostered in the activities of the various branches. Those who attended the Detroit annual meeting on Saturday, December 9, at the Statler, will gladly testify that the present generation is living up to the good old custom started over a quarter of a century ago. Starting promptly at two, President James Higgins of the local branch called on Supreme President of the A.E.S. R. M. Goodsell to act as chairman. The first speaker of the afternoon session was

Mr. T. F. Slattery of the Bureau of Engraving and Printing who told how currency, bonds and stamps are made, his talk being illustrated with slides.

Dr. Colin Fink, Columbia University, spoke on the "Electrodeposition of Manganese" and Dr. A. K. Graham of Philadelphia discussed the Electrolytic film. All three papers were enjoyed by the two hundred fifty persons present.

Mr. Charles Conley, chairman of the Dayton Convention Committee for 1940, was introduced at the close of the addresses. He told of the progress being made by his various committees, and made a strong plea for co-operation from the branches, to make the Dayton convention a complete success.

Seven hundred persons sat down to the banquet at seven in a room decorated with vari-colored balloons—hundreds of them. The meals served on occasions such as this are always a pleasant memory and this one was no exception. Jules Klein and his orchestra furnished the dinner music, which was followed by the floor show. All the acts were well received and thoroughly enjoyed, particularly the singing of Sally Johnson and Tommy Evans. Dancing, which lasted until the early morning hours, brought to a close the third and most successful of these annual events.

The Executive Board met at the call of the president. All members were present and matters of routine business transacted.

Simultaneously with the Executive Board meeting, there was a business session of the Research Committee, Mr. A. B. Wilson, the chairman, presiding. The good feeling of optimism and co-operation in connection with this meeting will be enlarged upon by the chairman at a future date. Suffice it to say now that much progress was made, subcommittees being appointed to look after the various details relative to the start of a new research program.

Dr. Blum was conspicuous by his absence. We hope the Doctor has completely recovered from his illness by this time.

Mr. and Mrs. Conley and a dozen more Daytonians were present. Other members of the Dayton Convention Committee were Messrs. Luechauer, Wise, Cochrane and Smith. Each lady was presented with a package of Penthouse Cologne, the men each receiving a pearl-handled penknife. Reserved tables were popular. Groups of persons knowing each other enjoyed the party much better, by sitting at the same table. Representatives from more than half the branches of the A.E.S. attended the meeting. All members of the Executive Board were present, as were nearly all members of the Research Committee.

Some of the members of the Detroit Branch who were responsible for the very excellent program and the success of the entire event, both educational and social, are as follows: J. Higgins, George Nankervis, Mose Cherry, A. B. Wilson, Wright Wilson, W. W. McCord, Carl Heussner.

THANK YOU

The members of the Executive Board and their wives hereby express their sincere thanks to the Detroit Branch members for the thoughtfulness and courtesy extended to them during their visit to Detroit in connection with the annual educational session and banquet.

R. M. Goodsell
Frederick and Mrs. Fulforth
Joseph L. Downes
Nelson and Mrs. Sievering
W. J. R. Kennedy

INDEX - 1939

January . . . December

JANUARY

Kasper — Current Distribution in Electrodeposition 11
Soffel — Generators and Their Troubles 27
Rinker — Factors to be Considered in Cleaning Before Bright Nickel Plating 33
International Convention 37
Notes on Annual Educational Sessions 38

FEBRUARY

Kasper — Current Distribution in Electrodeposition 91
International Convention 110
Stocker — Bright Nickel Plating 111
Weisberg — Purifying of Bright Nickel Solutions 122

MARCH

Papers and Exhibit Awards 177
International Convention 180
Oplinger — The Development of a Process for High Speed Copper Plating from Cyanide Solutions 181
Jeveli — Purifying Bright Nickel Solution 196
Hogaboom — Good Fellowship — The "Scouts" 199
Educational Program for 1939 Convention 228

APRIL

The Plated-Ware Exhibit 257
Educational Program for 1939 Convention 260
Loutrel, Jr. — The Use of Ferric Sulfate for Pickling Copper Alloys 263
Sterling — A Paper on Nickel Plating 271
Barry — Recent Developments in Barrel Plating and Rolling 275
Fulforth — From the Philadelphia Reminder 288
Wagstaff — Plating on Aluminum 315

MAY

Haas — The Application of Scientific Management in the Plating Room 349
Conley — Determination of Drag-out Loss 355
Ritzenthaler and Doyle — A New Rapid Stripping Solution for Tin Coatings 358
Educational Program for 1939 Convention 359
Ladies Program at the Convention 361
Fulforth — From the Philadelphia Reminder 364
Research Committee 391

JUNE

Fulforth — Educational Activities in the American Electroplaters' Society 433
Educational Program for 1939 Convention 444
Ladies Program at the Convention 446
Kroes — Solvent Degreasing and Its Application to the Plating Industry 447
Siefen — Advanced Technique in Polishing 455

JULY

Dayton, the 1940 Convention City 512
Edwards — Anodic Coating of Aluminum 513
List of Exhibitors at the Convention 534
Charleson — Finishing Base Metal Die Castings 538

AUGUST

Educational Program 588
Research Committee 591
A Letter from the President 592
Dornblatt, Lowe, Simon — A Study of Silver Plating for Industrial Applications 593
Pinner — A Discussion of Some of the Fundamentals of Electroplating Practice 615

SEPTEMBER

1940 Convention 668
Advertising Campaign 669
Towner — The Finishing of Die Cast Products 671
Smith — Purification and Filtration of Plating Solutions 687
Electro-Tinning (An Abstract) 702
$50.00 Award 720
Letter from Our President 722

OCTOBER

Hull — Current Density Range Characteristics — Their Determination and Application 753
Beckwith — Determination of Thickness of Electrodeposited Chromium 769
Camel — Alkali Cleaning as it Affects the Plating Industry 777

NOVEMBER

Smith — Anodic Treatment of Aluminum 843
Oldam — Simple Methods of Plating Solution Analysis 851
New Coating offers Unusual Corrosion Resistance (Reprinted from Oct. 23, 1939 issue of STEEL) 861
Research Meeting 886

DECEMBER

A Christmas Message from Our Founder 925
Weisberg — Rapid Methods for Heavy Nickel Plating 929
Tierney — Some of the Influences Affecting the Use of Spray Rinsing Facilities 937
Notes on Pitting 947

October 3, 1939

Mr. W. J. R. Kennedy
93 Oak Grove Avenue
Springfield, Massachusetts

Dear Mr. Kennedy:

Philadelphia Branch has authorized me, as chairman of the Resolutions Committee, to present to you the attached resolution for amendment of the By-Laws to follow the usual course of action.

We of the Philadelphia Branch feel that this amendment, when adopted, will be of immeasurable benefit to the Society, particularly in assisting practical men with worthwhile ideas who feel unqualified to express their thoughts in writing.

It will be appreciated if you will give this proposal early publicity so that it may be thoroughly discussed throughout the membership.

Yours sincerely,

L. A. CRITCHFIELD
Chairman: Resolutions Committee

Resolution:

In order to improve the A.E.S. MONTHLY REVIEW, better the arrangement of papers presented to the American Electroplaters' Society for publication, assure greater opportunity for full discussion of papers presented at the annual conventions, avoid duplication of copy, and, finally, to help electroplaters write more papers on the practical applications of electroplating; be it resolved that Article IV of the By-Laws of the American Electroplaters' Society be amended as follows to establish a Publications Committee:

Publications Committee:

A Vice President shall be chairman of and appoint the publications committee consisting of the Executive Secretary and three other members of the society.

The committee shall pass on the acceptability of all papers offered for publication in the MONTHLY REVIEW or for presentation to the annual convention and shall have sole authority to accept or reject papers, provided, however, that any member may appeal to the Executive Board against any decision of the committee in respect to a paper submitted by that member.

The committee shall review and edit all papers at the earliest possible date and offer to the writers thereof such helpful suggestions and criticisms as will lead to more interesting papers. The committee is empowered to submit papers to any society member who is a competent critic for his opinion.

The committee shall establish and announce a final date for acceptance of copy for the annual convention; limit the amount of material accepted for convention programs consistent with the length of program desired; and prepare and distribute preprints of convention papers to interested members sufficiently in advance of the convention meeting as to allow preparation of intelligent discussion.

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The Abstract Section

FREDERICK FULFORTH, *Chairman, Program and Educational Committee*

The Structure and Properties of Bright Nickel Deposits. By A. W. HOTHERSALL and G. E. GARDAM. *Electrodepositors' Technical Society*, 1939, 14 pp. The authors investigated three bright nickel plating processes as follows:

A. The solution contains nickel and cobalt sulfates and chlorides, sodium or nickel formate, and small amounts of ammonium salts, and formaldehyde.

B. The patent claims the addition to a nickel plating solution of "water dispersed colloids of molecular weight 5000 or less, chiefly *aromatic* polysulfonates containing more than one and less than four sulfonic acid groups."

C. The patent claims the addition to a nickel plating bath of *alkyl* naphthalene sulfonic acids or their sodium salts.

Deposits from the above processes all contained carbon, indicating the inclusion of organic matter in the deposition.

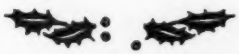
All of the deposits were of very fine grain structure.

X-Ray examination of the deposits showed that the (A) process has an oriented structure similar to that of soft matte nickel coatings. The deposit from (B) and (C) process showed no preferential orientation. These deposits are similar to a hard matte deposit obtained from a nickel ammonium sulfate bath.

All three processes gave very bright deposits in thin coatings on a base metal of very fine surface grain size, also bright deposits were obtained with thick coatings on base metals of large-grained surfaces (etched or bright-annealed). Thin coatings on large-grain sized surfaces only gave semi-lustrous deposits.

ROBERT SIZELOVE

Electrolytic Manganese. By WILLIAM L. HAMMERQUIST, *Steel*, October 30, 1939, Page 40. Electrolytic manganese is now being produced commercially 99.94% pure by the Electro Manganese Corporation, Knoxville, Tenn. The ore is first reduced in a furnace at 600 to 700°C., cooled and leached in 8000 gallon batches of spent electrolyte containing 200 g/l ammonium sulphate approximately 24 g/l sulphuric acid and a small amount of manganous sulphate. The solution is filtered to remove residue, then separated from iron, arsenic, nickel, cobalt, molybdenium, phosphorus, etc., by subsequent refining operations. The purified solution is electrolyzed in laminated wooden cells, lined with a proprietary phenol plastic. Lead anodes and polished stainless steel cathodes are used. After the solution has been electrolyzed for about 60 hours the cathodes are pulled and the manganese stripped. The finish of the cathode is an important factor in the process. If the finish is too smooth the



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manganese will drop off in the bath, if too rough it will be difficult to strip. A cathode efficiency of 50-60% is now being obtained.

D. S. HARTSHORN, JR.

Metal and Alloy Deposition from Thiosulfate Solutions. I. Single Metal Deposition of Copper, Cadmium, Zinc, and Nickel from Thiosulfate Solutions. By D. C. GERNES, G. A. LORENZ, and G. H. MONTILLON. *Trans. Electrochemical Society* **77**, (Preprint 77-1) (1939). A study of plating from thiosulfate solutions is reported with details of effects of changes in c.d., temperature, agitation, composition, addition agents, etc. The thiosulfate ion forms a complex with cuprous ion and possibly with the other metals. Depending on the cathode c.d., thiosulfate is more or less reduced at the cathode to form metallic sulfides either as a nonadherent layer on the surface of the deposit, or as a metal sulfide not distinguishable from the metal deposit. Recommended baths are:

Deposit	*Copper*	*Cadmium*	*Zinc*	*Nickel*
Metal salt	Cu_2Cl_2	$3CdSO_4.8H_2O$	$ZnSO_4.7H_2O$	$NiCl_2.6H_2O$
g./l., metal salt	40	40	60	47.5
$Na_2S_2O_3.5H_2O$, g./l.	400	250	200	200
$NaHSO_3$, g./l.	10	—	—	0-10
NH_4Cl, g./l.	—	40	25-50	25-50
C.d., amps./sq.ft.	5-14	14	9-18	4-18
Temp., °F.	77-122	room	room	room
Cathode efficiency	85-90%	90-92%	75-95%	65-90%
Anode efficiency	100-103%	—	104%	105%
Purity of deposit	100%	95%	100%	30-78%
Agitation	recommended	moderate	—	recommended

The cuprous chloride must be especially freed from cupric compounds. The copper deposits were bright and adherent; in general, copper did not deposit on steel by immersion. The zinc and cadmium deposits were adherent and covered by a gray powder containing sulfur, easily removed by light buffing to give a bright plate. The cathode efficiency in the cadmium dropped as the solution was used. The nickel deposits were smooth, adherent, metallic, nickel-white, and as resistant to salt spray corrosion as pure nickel plates, although they contained from 22 to 70% sulfur.

ERNEST H. LYONS, JR.

A Safe Substitute for Potassium Cyanide (in silvering copper surfaces). By K.YUZHNYI. *Poligraf. Proizv.* (*U. S. S. R.*) **1938**, No. 4, 20; *Khim. Referat. Zhur.* **1**, No. 11-12, 104 (1938). It is proposed to substitute the potassium cyanide used in the silvering process of the copper surfaces with thiosulfate in the following ratios: 20g. of $AgNO_3$, 10g. of NaCl, 40-50g. of $Na_2S_2O_3$ and 1000 cc. of water.

W. R. HENN

Chemical Abstracts **33**, 8506 (1939).

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Potentiometric Investigations on the Cathodic Deposition of Copper in the Presence of Iron Salts. By M. GELOSO and P. DESCHAMPS. *Bull. soc. chim.*, **6**, 1100-12 (1939); *Chemical Abstracts* **33**, 8505 (1939). In electrodepositing copper from solutions containing copper sulfate, ferric nitrate, and sulfuric and nitric acids, ferric ion was reduced to ferrous at the cathode, nitric acid was probably reduced to nitric oxide which gave brown $(FeNO)^{++}$, and ferric ion dissolved copper from the cathode. The velocity of this solution increased with the concentration of ferric and ferrous ions and nitric acid.

ERNEST H. LYONS, JR.

Cadmium and Arsenic in Nickel Baths. By E. RAUB and M. WITTUM *Korrosion u. Metallschutz* **15**, 127-30 (1939); *Chemical Abstracts* **33**, 7204 (1939); also M. WITTUM, *Mitt. Forsch-Inst. Edelmetalle staatl. höheren Fachschule schwäb. Gmund*, June **1939**, 13-17; *Chemical Abstracts* **33**, 6724 (1939). Cadmium is a brightener in nickel plating baths; the best cadmium content is 0.3-1.6% with a pH of 6.8. Cathode potential-c.d. curves obtained in baths containing 19 ozs. nickel sulfate and 1.3 ozs. boric acid per gallon, with cadmium contents up to 12.7% of the total metal content indicate a decreased throwing power with increasing cadmium content. The nickel deposits contain cadmium in increasing amounts as the cadmium content of the bath increases, and in decreasing amounts as the c.d. increases; the alloy deposits are soft and adhere well, and have the color of cadmium. It is concluded that cadmium additions for bright nickel baths are less suitable than organic brighteners. With arsenic (added as As_2O_3) contents up to 3.7% of total metal content, the cathode potential decreased with increasing arsenic concentration. Due to the low hydrogen overvoltage of arsenic, the bath becomes very alkaline at the cathode, resulting in the precipitation of finely dispersed nickel hydroxide, and the reduction of the arsenic to the poisonous gas arsine, especially at higher c.ds. At the anode, arsenic is oxidized to As_2O_5. The deposits contain a higher percentage of arsenic than the bath, owing to its nobler nature. The color of the arsenic-nickel deposits is irregular, dull-gray for low arsenic baths at room temperature; bright, streaky and brittle for high c.d. They have no commercial value.

ERNEST H. LYONS, JR.

The Use of Insoluble Anodes in Plating Baths. By RICHARD SPRINGER. *Z. Metall u. Schmuckwaren-Fabrikat. Verchrom.* **18**, No. 10, 11-13; No. 11, 11-12 (1937); *Chem. Zentr.* **1938**, **I**, 172. When insoluble anodes are used in nickel baths, nickel salts (carbonate) must be regularly added. However, the electroplate so produced may be rough. A better practice, which also has its disadvantages, is the use of bags or sacks filled with nickel carbonate into which the anode is inserted. According to the LPW process, the scrap nickel anodes are regenerated or reactivated in a special bath overnight. The c.d. is 19-27 amps/sq.ft., and the temperature 70-80°F. Carbon and pure lead anodes are not suitable. On the other hand, anodes of lead alloys are very durable. For chlorine-free baths, anodes of a particular iron alloy are suitable. Iron is the most satisfactory insoluble anode for cadmium baths. It is recommended that the pH be kept above 13 and that the anode surface be large

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enough that the c.d. does not exceed 3.7 amps./sq.ft. If cadmium carbonate is used to increase the metal content, the soda content steadily increases and the bath must be regularly diluted or renewed. Lustrous deposits are not obtained from cadmium baths when insoluble anodes are used for some time. Hard lead anodes or carbon anodes sewed into thick muslin are to be considered for acid copper baths. It is necessary to neutralize the anodically formed sulfuric acid only once a day. Iron anodes can be used in potassium cyanide copper baths if the pH is kept above 13. At all times only about half as much potassium cyanide as copper should be present in the bath. Such baths should be regenerated by the addition of cuprous cyanide.

M. G. MOORE

Chemical Abstracts **33**, 7205 (1939).

Electrodeposition of Copper from Cuprous Chloride Solutions. By N.P. DIEV and A. G. LOSHKAREV. *J. Applied Chem.* (*U. S. S. R.*) **12**, 582-92 (in French, 592-3) (1939). Perfect cathode deposits of copper were obtained from cuprous chloride solutions in the nitrogen and air atmosphere at c.d. of 100-150 amp./sq.m. (9.3-14 amps./sq.ft.). Even at c.d. up to 400 amps./sq.m. (37 amps./sq.ft.) the deposits were satisfactory. An increase of temperature from 30° to 50°C., or an increase of the amount of gelatin in the electrolyte above 1.0 g./l., practically had no effect on the appearance of the cathode deposit. In the absence of gelatin, copper was deposited in the form of loose coarse crystals, whereas in the presence of 0.5-1.0 g./l., gelatin fine crystals strongly attached to to the cathode were obtained. The cathode current efficiency was 99% and better. The protection of electrolyte surface with petrolatum or oil reduced the losses due to oxidation of the cuprous chloride.

A. A. PODGORNY

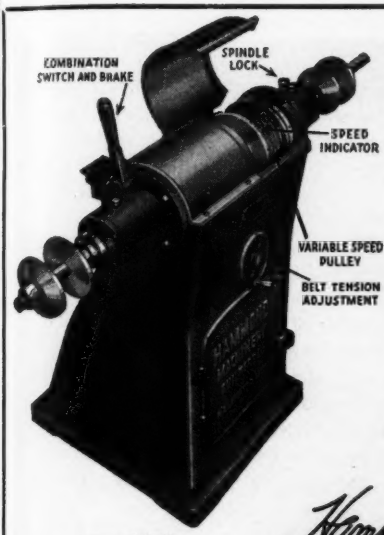
Chemical Abstracts **33**, 8504 (1939).

Tartrate Solutions after Electroplating. By R. SPRINGER. *Oberflächentech.* **16**, 161 (1939). In order to remove the last traces of cyanide plating solution held in fine cracks of electroplated objects, Springer recommends dipping in a potassium tartrate solution for 3 minutes to 16 hours. $KHC_4H_4O_6$ does not attack the metal as it is only weakly acid; the solution has 4-5 g. salt and 1-1.5 g. H_2SO_4 per liter, pH 1.8-3.4.

M. HARTENHEIM

Chemical Abstracts **33**, 8506 (1939).

Crystal Types of Electrodeposits. By K. M. GORBUNOVA. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* **1938**, 1175-95 (in English, 1195-6; *Chemical Abstracts* **33**, 6167 (1939). Cadmium deposits form acid chloride and sulfate electrolytes were studied, temperature 32°-150°F., c.d. 9.3-67 amps./sq.ft., concentration of salt 0.2-6*N*, of acid 1*N*. When the concentration of cadmium was increased, the crystal size of the deposit decreased. Increasing c.d. or temperature decreases the crystal size in chloride solutions but increases it in the sulfate solutions. As addition agents gelatin, brucine, or nicotine sulfate complicated the crystal structure. When laminar deposits had



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their base planes parallel to the cathode surface, they were shiny and resistant to corrosion, but when the base plane was perpendicular to the cathode surface, they were dull, rough, and had a low corrosion resistance. Laminar deposits were more distinct in deposits from the chloride than from the sulfate solutions.

ERNEST H. LYONS, JR.

Rhodium as a Plating Metal in the Precious-Metal Industry. By RALPH W. HARBISON. *Deut. Goldschmiede-Ztg.* **40**, 331-2 (1937); *Chem. Zentr.* **1938, I**, 174. At present only the acid sulfates and phosphates are used as electrolytes, the former especially for the plating of precious metal parts. The rhodium deposit is in general very thin, 20 mg./sq.dm. When the thickness is greater than 25μ (0.0001 in.) a dull coating is deposited and even very thin layers show a tendency to crack and peel. For plating out a coating of 90% platinum and 10% rhodium the electrolyte recommended contains: 12.5 g./l., $PtCl_4$, 1.5 $RhCl_3$ and 20 $NaNO_2$. This solution is heated for a long time at 85-90°C., and then 35cc. NH_3 is added. Potential drop is 7v., c.d., 0.8-1.1 amp./sq.dm., temperature 75-95°C.

M. G. MOORE

Chemical Abstracts **33**, 7205 (1939).

Improved Electrotinning of Cables. By M. MITNITSKII. *Tsvetnye Metal* **12**, No. 4, 82-6 (1937); *Chem. Zentr.* **1938, I**, 173. The advantages of electrotinning of electrical cables from alkaline baths rather than hot tinning are discussed. The coating obtained is very uniform and there is a great saving in tin and in working space. Moreover, the points of contact of the individual wires of the twisted cable are uniformly coated as a result of the repeated turning and bending of the cable while it is drawn through the plating bath.

M. G. MOORE

Chemical Abstracts **33**, 7204 (1939).

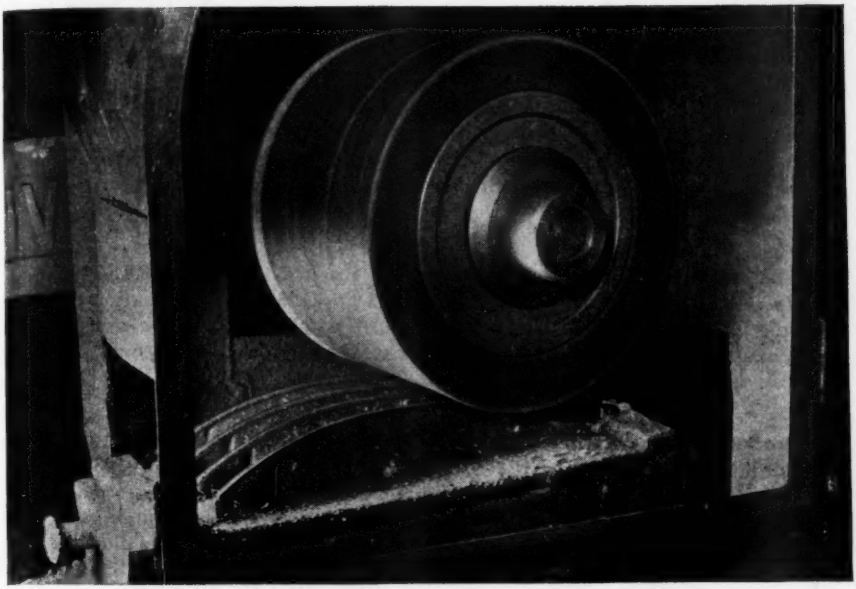
Electrolytically Refined Metals with Different Properties. By MAX SCHLÖTTER. *Research and Progress* **3**, 159-62 (1937); *Chem. Zentr.* **1938, I**, 714-15; *Chemical Abstracts* **33**, 7203 (1939). Electrolytic deposits may have unusual properties from foreign substances included from the electrolyte. The anion is a controlling factor for both nuclear formation and crystal growth. Large anions repress crystal formation in lead and tin deposits. Silver deposited from iodine solutions contains iodine and is not tarnished by silver; copper containing iodine is sensitive to light. Lustrous nickel deposits contain nickel oxides.

ERNEST H. LYONS, JR.

Interaction of Electrodeposited Metals with the Cathode. By K. M. GORBUNOVA. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.*, **1938**, 893-904 (in English, 904). From a study of the potential-time curves in the electrodeposits of cadmium on cadmium-silver alloys (10% and 40% silver) it is concluded that diffusion of cadmium into the alloy occurs, the diffusion coefficient being estimated at 6×10^{-7} cm./day.

British Chem. & Phys. Abstracts.

Chemical Abstracts **33**, 8506 (1939).



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Effect of Hydrogen Peroxide on the Electrodeposition of Chromium. By FRIEDRICH MULLER and R. PIETSCH. *Korrosion u. Metallschutz* **15**, 122-6 (1939); *Chemical Abstracts* **33**, 7205 (1939). When 2.1 to 38.7% hydrogen peroxide was added to chromium plating solutions, part of it decomposed and part formed Cr_2O_3. It did not affect the hardness of the plate or the brightness range, but resulted in definite improvement of the cathode efficiency and throwing power. ERNEST H. LYONS, JR.

The Anodic Oxidation of Aluminum. By J. W. CUTHBERTSON. *J. Inst. Metals* **65**, Advance copy, No. 840, 23 pp. (1939). The formation of anodic films on aluminum by a.c. was studied with a cathode ray oscillograph, and conclusions drawn from the electrical behavior of the circuit. ERNEST H. LYONS, JR.

Production and Structure of Electrolytically Produced Aluminum Oxide Layers. By WERNER BAUMANN. *Z. Physik* **111**, 708-36 (1939); *Chemical Abstracts* **33**, 6170 (1939). A study of the types of oxide layers formed by anodizing aluminum shows that the speed of re-solution of the film is of controlling importance. It is related to the electrolyte, and number and dimensions of the pores. ERNEST H. LYONS, JR.

The Effect of Basis Material on the Quality of Electrozinc Deposits. By H. DIENBAUER. *Berg-u. hüttenmänn. Monatsh. montan. Hochschule Leoben* **87**, 142-8 (1939); *Chemical Abstracts* **33**, 7667 (1939). Corrosion resistance, porosity, hardness, and adhesion of electroplated zinc on hot and cold rolled open-hearth and electric furnace steel (not however of commercial grade) was studied. Less porosity was found on open-hearth steel. ERNEST H. LYONS, JR

Throwing Power in Electroplating. By V. P. SACCHI. *Ind. meccan.* **21**, 532-9 (1939). The factors which influence the distribution of the electrodeposit at different points of one and the same object are studied. The thickness of the deposit depends on where the point is located in the bath. It is greater the nearer it is to the bottom of the bath, and less the nearer it is to the center of the bath. The distribution of voltage and currents over the bath is theoretically treated; the throwing power can be calculated from the formula: th.p. = 100 $({}^{v}cl - {}^{v}cv) + ({}^{v}al - {}^{v}av)/{}^{V}rl$, where ${}^{v}cl$ is the dynamic cathode potential of the surface element at some distance from the anode; ${}^{v}cv$ the same in the proximity of the anode; ${}^{v}al$ the dynamic anode potential of the anode surface element at the exit of the current; ${}^{v}av$ the same in the proximity of the anode; ${}^{V}rl$ the voltage drop due to current and resistance of the anode surface element. These values can readily be measured. The current efficiency increases in baths with a pH less than 7 with increasing c.d. in copper, nickel, cobalt, and zinc baths, and practically always in iron baths, but is independent of the c.d. in cadmium baths; efficiency also increases with increasing metallic ion concentration and increasing pH, i.e., diminishing acidity. The effect of polarization is hereby discussed at some length. Temperature exerts an influence on

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all the factors; ionization generally decreases with increasing temperatures, ion velocity increases with increasing temperature (as the viscosity of the bath decreases).

M. HARTENHEIM
Chemical Abstracts **33**, 8506 (1939).

Brush Plating of Nickel and Copper. By A. Z. RIVKIND and L. V. ITSELEV. *Korroziya i Bor'ba s Nei* **4**, No. 1, 20-35 (1938); *Khim. Referat. Zhur.* **1**, No. 11-12, 106 (1938). Nickel on soft steel, and copper on a nickel base were studied. The nickel electrolyte consisted of $NiSO_4 \cdot 7H_2O$ 400g., $Na_2SO_4 \cdot 10H_2O$ 300g., H_3BO_3 30g. and 1 liter of water. At low c.d., no addition of salt was necessary, and a small concentration was required. At optimum conditions and with an e.m.f. of 10 v. the c.d. increased with the temperature to 12 amp./sq.dm. (112 amps./sq.ft.) at room temperature, at to 18 amps./sq.dm. (178 amps./sq.ft.) at 60°C. (140°F.). Optimum pH = 4.5, the yield was 90%, and the electrolyte velocity 200 ml./sq.dm./min. At smaller velocities an uneven wetting of the surface took place, and the resistance was high. A further velocity increase did not increase the c.d. Satisfactory deposits of nickel of 0.005 mm. (0.0002 in.) were obtained. Thicker deposits showed cracks and did not adhere well. This fact permits the use of brush plating of nickel for decorative purposes only and with an undercoat of copper. The optimum composition of the electrolyte for copper was: $CuSO_4 \cdot 5H_2$ 200 g., H_2SO_4 (1.84) 50 g. and water 1 liter. This electrolyte at 10 v. permits a c.d. of 35-40 amp./sq.dm. (325-372 amps./sq.ft.). The optimum electrolyte velocity was 200 ml./sq.dm./min., and the yield 98-100%. Deposits of copper of 0.025 mm. (0.001 in.) were almost pore free, but were porous up to 0.01 mm. (0.0004 in.). The elasticity and the cohesion of the the copper deposits were lower than those obtained by the usual electrolytic methods. A decrease of the brush pressure during the rubbing process, and an increase of its speed, had a beneficial effect on the elasticity of the deposits.

W. R. HENN
Chemical Abstracts **33**, 8506 (1939).

Effect of Composition of Electrolyte, the Current Density, and Bath Temperature on the Properties of Electrolytic Nickel. By S. MAKAR'EVA. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.*, **1938**, 1211-23 (in English 1223-4). Nickel was deposited on polished copper electrodes under two different conditions: (1) c.d. 0.1 amp./sq.dm. (0.93 amp./sq.ft.) and 20°C. (77°F.); (2) c.d. 5 amp./sq.dm. (46.5 amp./sq.ft.) and 60°C. (140°F). The electrolyte was not stirred; pH constant at 5.3. Luster, hardness, porosity, microstructure and crystal orientation of nickel layers 20μ (0.00078 in.) thick were determined for various c.d., temperature, and composition of solution. All nickel deposits from chloride baths at 20°C. had a yellow tinge, were less lustrous, less oriented, but considerably harder and more porous than deposits obtained under the same conditions from sulfate baths. The differences in the properties were more pronounced at 60°C. By increasing the c.d., the hardness of nickel deposits obtained from sulfuric

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acid baths decreased and the luster improved, but for nickel deposits obtained from hydrochloric acid baths, the opposite effects were produced at 60°C. The addition of ions of potassium, ammonium, and magnesium to sulfate baths produced deposits more lustrous, harder, and more uniform in texture and which changed very little with change in c.d. or temperature. The least porous deposits were obtained from baths containing potassium fluoride and potassium chloride. By increasing the c.d. from 0.1 to 5 amp./sq.dm. at 20°C., the porosity and grain size decreased while the hardness and luster increased, but at 60°C. the opposite effects were produced. At a c.d. of 5 amp./sq.dm., the effects due to change in composition of the solution almost disappeared.

B. Z. KAMICH

Chemical Abstracts **33**, 6167 (1939).

The Influence of Colloids on the Structure of Electrodeposits. By WILLIBALD MACHU. *Österr. Chem.-Ztg.* **42**, 244-7 (1939). A study of the properties of adsorption layers of colloids on metals and of metallic corrosion leads to the conclusion that colloids and substances of high molecular weight are adsorbed on the cathode during electrodeposition, forming a porous diaphragm with a "pin-cushion" structure. The discharge of the cations and the deposition of metal is believed to occur in the intermicellar spaces in the diaphragm. Since the pores are small the crystal nuclei are small and their number is high, and thus they give a fine-grained deposit. Growth of the nuclei is hindered by the reduced rate of diffusion of ions in the colloidal diaphragm. Uniformity of structure is attributed to restriction by the pores in the direction of growth of the metal crystals. Previous work on the effect of colloids on the form of electrodeposited metals is reviewed.

S. GLASSTONE

Chemical Abstracts **33**, 6725 (1939).

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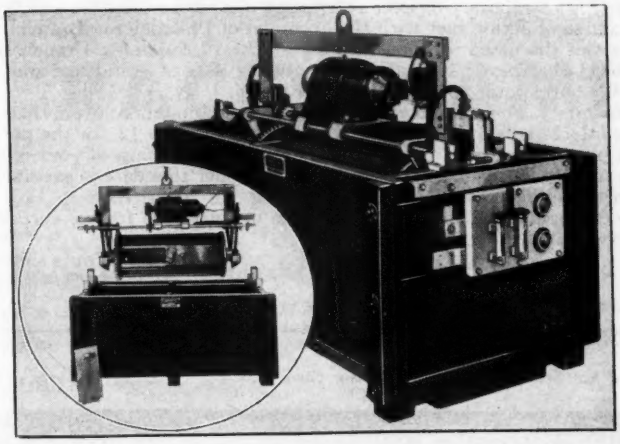

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"This was discussed in open meeting at the Philadelphia Branch business session on December 8, 1939. We were given a vote of confidence and assured of the full co-operation of Philadelphia Branch.

"Accordingly, we would like to hold an open meeting for all from this vicinity who are interested early in January, preferably January 12, for the purpose of starting our organization. We would like to take advantage of your offer to be with us to help us. Will you let me know whether this date is satisfactory or what date will meet with your convenience?

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Insulating joints are recommended for cleaning tanks, plating tanks and heating and cooling lines.

A. B. Hoefer has been appointed eastern district manager, Udylite Corp., Detroit, with headquarters at 30 East Forty-second Street, New York. He replaces W. L. Cassell, who has resigned to join MacDermid, Inc., Waterbury, Conn. Following graduation from Purdue University, Mr. Hoefer joined General Chromium Corp., Detroit, and early in 1929 joined the New York office of Udylite as sales engineer. L. J. George, sales engineer, associated with Udylite since 1929, has been transferred from the Cleveland office to New York.

UNITED CHROMIUM INCORPORATED TRIES ITS SUIT AGAINST GREAT LAKES PLATING & JAPANNING COMPANY

A decision has been handed down in the recent suit brought by United Chromium, Incorporated against the Great Lakes Plating & Japanning Co. of Chicago. In a decision filed November 29, 1939, the Federal District Court for the Northern District of Illinois, Eastern Division, has held both of our Fink Patents, Nos. 1,581,188 and 1,802,463, valid and infringed. The specific claims found to be infringed are Nos. 4, 6, 10, 13 and 18 of Patent No. 1,581,188, and Nos. 1, 2, 3 and 4 of Patent No. 1,802,463.

Membership Report

To December 1, 1939

APPLICATIONS

Adolph Bialicki, 210 Broad St., Newark, New Jersey
Associate, Newark Branch

William J. Hennessy, Penna Salt Mfg. Company, Pittsburgh, Pa.
Associate, Pittsburgh Branch

Bernard John Kubrak, 13815 Southview Ave., Cleveland, O.
Associate, Cleveland Branch

Julius Teres, U. S. Army Air Corps, Wright Field, Dayton, O.
Associate, Dayton Branch

William F. Whitty, c/o Wallingford Steel Co., Wallingford, Conn.
Associate, Waterbury Branch

Knute Nelson, 1022 Norman St., Bridgeport, Conn.
Active, Bridgeport Branch

Frank A. Singer, 357 Bishop Ave., Bridgeport, Conn.
Associate, Bridgeport Branch

Jack Kaye, C&S Casting & Plating Co., Inc.
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